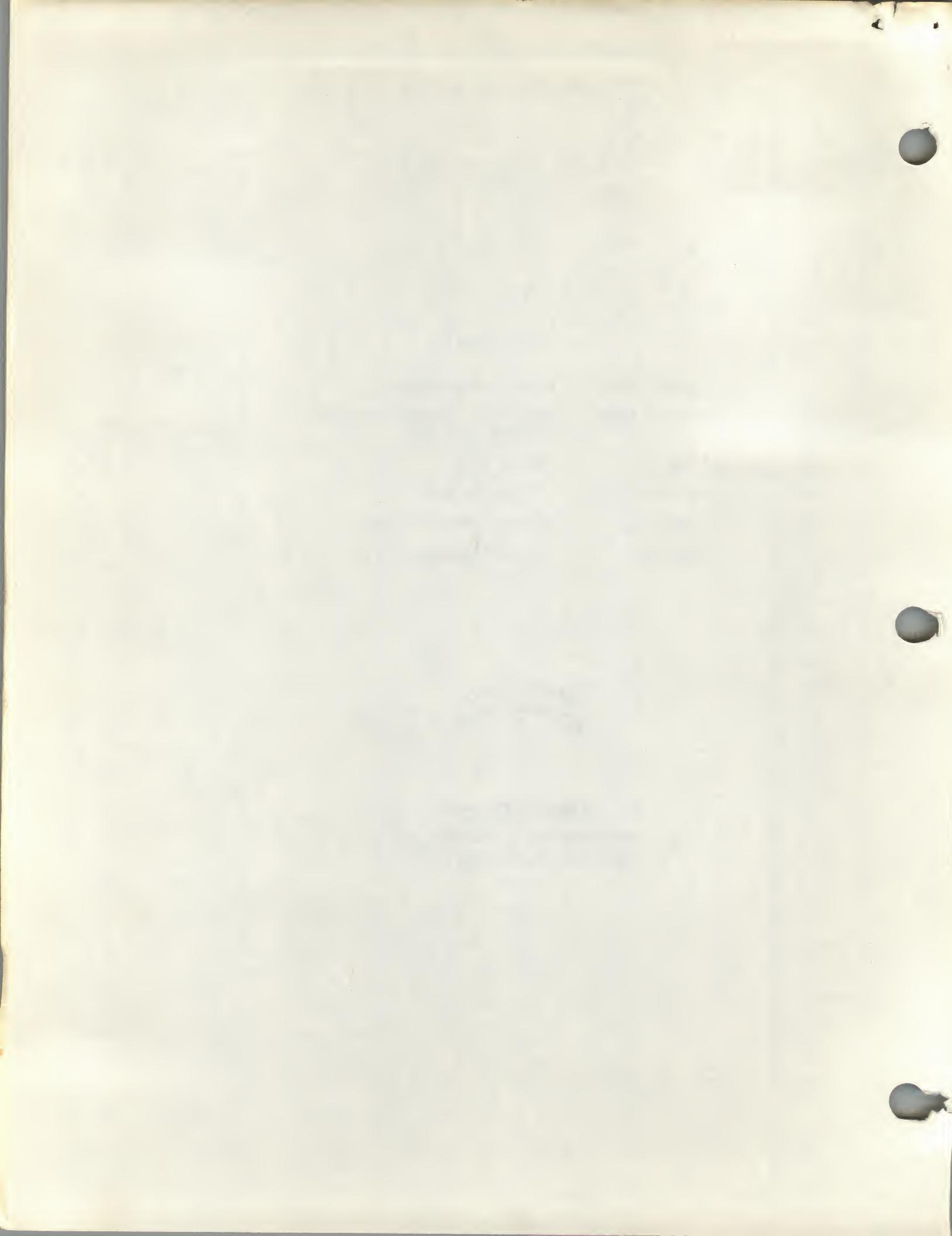IDENTIFICATION

PRODUCT CODE:      MAINDEC-08-DHDRA-A-D

PRODUCT NAME:      DR8-EA 12 CHANNEL BUFFERED
                   DIGITAL INTERFACE

DATE:              MARCH, 1972

MAINTAINER:        DIAGNOSTIC GROUP

AUTHOR:            MICHAEL DAVIS/P. COYNE

REPLACES:          MAINDEC-8E-DØQB

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SUBJECT TO CHANGE WITHOUT NOTICE.

1. ABSTRACT

THIS PROGRAM IS A DIAGNOSTIC AND EXERCISER FOR THE
DR8-EA 12 CHANNEL BUFFERED DIGITAL INTERFACE, ALL
FUNCTIONS ARE TESTED AND ERRORS ARE REPORTED BY HALTS
AND/OR ERROR TYPEOUTS.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP8E STANDARD COMPUTER WITH 4K OF CORE
ASR-33 TELETYPE (OR EQUIVALENT)
DR8-EA WITH TEST CABLE

2.2 STORAGE

THE PROGRAM USES LOCATION 0000-3377

3. LOADING PROCEDURE

THE STANDARD PROCEDURE FOR LOADING BINARY TAPES SHOULD
BE USED.

4. STARTING PROCEDURE

4.1 STARTING ADDRESS

200-INPUT DEVICE CONFIGURATION
201-START WITH STANDARD CONFIGURATION

4.2 SWITCH SETTINGS

FOR EITHER STARTING ADDRESS, NORMAL SETTING IS SR0-SR11=
0 (DOWN).

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY
SET SWITCH REGISTER TO DESIRED STARTING ADDRESS
LOAD ADDRESS
CLEAR SWITCHES
PRESS CLEAR AND CONTINUE

4.3.1   FOR STARTING ADDRESS 200

THE PROGRAM WILL TYPE "SET SR FOR DEVICE CODE AND CONT"
AND THEN HALT.

SET SWITCHES TO 00X WHERE X IS AN OCTAL
NUMBER CORRESPONDING TO THE 3 LSB OF THE DEVICE SELECTOR CODE.
PRESS CONTINUE.

PROGRAM WILL RESPOND BY TYPING
"SET SR FOR INTERRUPT JUMPERS AND CONT" AND THEN HALT.
SET SWITCHES FOR ALL INPUT REGISTER BITS JUMPERED TO INTERRUPT.
PRESS CONTINUE.

PROGRAM WILL RESPOND BY TYPING
"SET SR FOR FLIPFLOP JUMPERS AND CONT" AND THEN HALT.
SET SWITCHES FOR ALL INPUT REGISTER FLIPFLOPS.
PRESS CONTINUE.

PROGRAM WILL RESPOND BY TYPING
"SET SR FOR RUN" AND THEN HALT.
SET SWITCHES AS IN 4.2 OR 5.1
PRESS CONTINUE.

PROGRAM WILL BEGIN TEST EXECUTION

4.3.2   FOR STARTING ADDRESS 201

SET SWITCHES AS IN 4.2 OR 5.1
PRESS CLEAR AND CONTINUE.

PROGRAM WILL BEGIN TEST EXECUTION

5.  OPERATING PROCEDURE

5.1  OPERATIONAL SWITCH SETTINGS

SR0=1, SUPPRESS ERROR HALT
SR1=1, SUPPRESS ERROR TYPEOUT
SR2=1, LOOP ON CURRENT TEST
SR3=1, LOOP WITH CURRENT DATA
SR4=1, SUPPRESS BELL OR TYPEOUT AT END OF PASS
SR5=1, SUPPRESS ITERATIONS
SR6=1, ESCAPE TO NEXT TEST ON ERROR

5.2  PROGRAM AND/OR OPERATOR ACTION

5.2.1.1  WITH SWITCHES SET AS IN 4.2, THE PROGRAM WILL RUN ALL
TESTS SEQUENTIALLY, EACH IOT TEST WILL BE REPEATED 4096
TIMES, EACH DATA TEST WILL BE REPEATED 50 TIMES. AFTER
ALL TESTS HAVE BEEN COMPLETED, THE PROGRAM WILL TYPE "DR"
AND START ALL TESTS AGAIN.
IF AN ERROR OCCURS, THE PROGRAM WILL HALT AND TYPE AN
APPROPRIATE ERROR MESSAGE (SEE SECTION 6 FOR DETAILS).

5.2.1.2  WITH SR0=1 (UP), PROGRAM ACTION WILL BE AS IN 5.2.1.1,
EXCEPT NO TYPEOUT WILL OCCUR.

5.2.1.3  WITH SR2=1(UP) PROGRAM ACTION WILL BE AS IN
5.2.1.1, EXCEPT NO TYPEOUT WILL OCCUR. THE ADDRESS OF THE
FAILING TEST WILL BE DISPLAYED IN THE COMPUTER AC.

5.2.1.4  WITH SR4=1(UP), PROGRAM ACTION WILL BE AS IN 5.2.1.1 EXCEPT
NO END OF PASS TYPEOUT WILL OCCUR.

5.2.1.5  WITH SR5=1 (UP), EACH TEST WILL BE EXECUTED ONLY ONCE.
INSTEAD OF TYPING "DR", THE PROGRAM WILL RING THE TTY BELL

5.2.1.6  WITH SR0=1 AND SR6=1, PROGRAM ACTION WILL BE AS IN 5.2.1.1
IF NO ERRORS OCCUR.
IF AN ERROR OCCURS, THE PROGRAM WILL TYPE AN APPROPRIATE
ERROR MESSAGE AND IMMEDIATLY TERMINATE ITERATIONS OF THE
FAILING TEST. THE PROGRAM WILL THEN START THE NEXT TEST
IN SEQUENCE.

6. ERRORS

6.1 NORMAL OPERATION

IF AN ERROR OCCURS WITH SWITCHES SET AS IN 4.2, THE PROGRAM
WILL TYPE AN APPROPRIATE ERROR MESSAGE (WITH DATA IF APP-
LICABLE) AND HALT.

THE FORMAT OF THE ERROR TYPEOUT IS

XXXX    MESSAGE
        HEADER FOR DATA (IF APPLICABLE)
        DATA           (IF APPLICABLE)
XXX=    ADDRESS OF JMS TO ERROR ROUTINE IN TEST THAT FAILED.

6.2 ERROR RECOVERY

SET SR6=1(UP) TO ESCAPE TO NEXT TEST, PRESS CONTINUE.

6.3 ERROR LOOP (IOTS)

SET SRØ=1   TO SUPPRESS HALT
SET SR1=1   TO SUPPRESS TYPEOUT
SET SR2=1   TO LOOP ON CURRENT FAILING TEST

6.4 ERROR LOOP (DATA)

SAME AS 6.3 EXCEPT USE SR3 INSTEAD OF SR2 TO LOOP WITH CURRENT
DATA.

7. RESTRICTIONS

7.1 STARTING RESTRICTIONS

TEST JUMPER CABLE MUST BE INSTALLED.
ANY FLOATING INPUTS TO INPUT REGISTER SHOULD BE
GROUNDED, OR ERRORS MAY OCCUR.

7.2 OPERATING RESTRICTIONS

NONE

8.     MISCELLANEOUS

8.1    EXECUTION TIME

       EXECUTION TIME IS APPROXIMATELY 3 MINUTES FOR FULL ITERATION
       AND APPROXIMATELY 10 SECONDS WITH ITERATIONS SUPPRESSED.

9.     PROGRAM DESCRIPTION

       THE DR8-EA IS A TEST OF ALL FUNCTIONS OF THE INTERFACE.

       THE PROGRAM SEQUENCE IS AS FOLLOWS:

       ALL BASIC IOT TESTS ARE EXECUTED 4096 TIMES.
       ALL OUTPUT REGISTER FUNCTIONS ARE TESTED WITH BINARY COUNT PATTERNS.
       ALL INPUT REGISTER FUNCTIONS ARE TESTED USING BINARY COUNT PATTERNS.
       INTERACTION BETWEEN INPUT AND OUTPUT REGISTERS IS TESTED FOR
       WITH BINARY COUNT PATTERNS.
       ALL SKIPS AND INTERRUPTS ARE TESTED USING BINARY COUNT PATTERNS.

10.    LISTING

```
                        /MAINDEC-08-DHDRA-A
                        /DR8-EA
                        /12 CHANNEL BUFFERED I/O DIAGNOSTIC
                        /COPYRIGHT 1972, DIGITAL EQUIPMENT CORP., MAYNARD, MASS, 01754

                        /STARTING ADDRESS!             200-INPUT DEVICE CONFIGURATION
                        /                              201-USE STANDARD CONFIGURATION

                        /SWITCH REGISTER OPTIONS
                        /
                        /SR00  =1, SUPPRESS HALT ON ERROR
                        /SR01  =1, SUPPRESS ERROR TYPEOUT
                        /SR02  =1, LOOP ON CURRENT TEST
                        /SR03  =1, LOOP WITH CURRENT DATA
                        /SR04  =1, SUPPRESS BELL AT END OF PASS
                        /SR05  =1, SUPPRESS ITERATIONS
                        /SR06  =1, ESCAPE TO NEXT TEST ON ERROR

                        /INSTRUCTION DEFINITIONS
                        /
7421                    MQL=7421
7501                    MQA=7501
7002                    BSW=7002
6007                    CAF=6007
6003                    SRQ=6003
4432                    DBDI=JMS I XDBDI
4433                    DBEI=JMS I XDBEI
4434                    DBSK=JMS I XDBSK
4435                    DBCI=JMS I XDBCI
4436                    DBRI=JMS I XDBRI
4437                    DBCO=JMS I XDBCO
4440                    DBSO=JMS I XDBSO
4441                    DBRO=JMS I XDBRO

                        /LOCATION EQUIVALENCIES
                        /
3026                    MSTDGT=ERADR+1
3027                    LSTDGT=ERADR+2

                        /GENERAL VARIABLES
                        /
0010    0010            *10
0020    0000            POINT1,  0
                        *20
0020    0000            CNTR1,   0
0021    0000            DATA1,   0
0022    0000            DATA2,   0
0023    0000            DATA3,   0
0024    0000            DATA4,   0
0025    0000            DATA5,   0
0026    7777            IJUMPE,  7777          /INTERRUPT JUMPER MASK

0027    7777            FJUMPE,  7777          /FLIPFLOP JUMPER MASK
```

```
0030  0000        TYPFLG, 0
0031  0000        LPCNT,  0

                  /
                  /INDIRECT POINTERS
                  /
0032  0261        XDBDI,  DBDIX
0033  0266        XDBEI,  DBEIX
0034  0273        XDBSK,  DBSKX
0035  0300        XDBCI,  DBCIX
0036  0305        XDBRI,  DBRIX
0037  0312        XDBCO,  DBCOX
0040  0317        XDBSO,  DBSOX
0041  0324        XDBRO,  DBROX
0042  3200        XPRINT, PRINT
0043  3251        XTYPE,  TYPE
0044  2600        XERROR, ERROR
0045  2667        XLOOP1, LOOP1
0046  2712        XLOOP2, LOOP2

                  /TEST INITIALIZATION
                  /
0200                      *200
0200  5202                JMP   STARTI
0201  5244                JMP   START2
0202  6007        STARTI, CAF               /CLEAR ALL FLAGS
0203  4442                JMS I XPRINT      /TYPE "SET SR FOR DEVICE
0204  3377                M1-1              /CODE AND CONT"
0205  7402                HLT               /HALT FOR SWITCHES
0206  7604                LAS               /GET SWITCHES
0207  0377                AND  (7            /MASK DEVICE CODE
0210  7106                CLL RTL           /POSITION BITS
0211  7004                RAL
0212  1376                TAD  (6500         /GENERATE BASIC IOT
0213  3247                DCA  IOTS          /SAVE BASIC IOT
0214  4442                JMS I XPRINT      /TYPE "SET SR FOR JUMPERS
0215  3420                M2-1              /AND CONT"
0216  7402                HLT               /HALT FOR SWITCHES
0217  7604                LAS               /GET SWITCHES
0220  3026                DCA  IJUMPER
0221  4442                JMS I XPRINT      /SAVE JUMPER MASK
0222  3444                M2A-1
0223  7402                HLT
0224  7604                LAS
0225  3027                DCA  FJUMPER
0226  1375                TAD  (-10          /8 IOTS WILL BE
0227  3020                DCA  CNTR1         /SET UP
0230  1260                TAD  DIOT          /STORE INSTRUCTION FOR
0231  3233                DCA  PNTR1         /IOT SET UP
0232  1247                TAD  IOTS          /GET IOT
0233  0000        PNTR1,  0                 /STORE IT
0234  2233                ISZ  PNTR1         /PREPARE TO STORE
0235  2247                ISZ  IOTS          /NEXT IOT
0236  2020                ISZ  CNTR1
```

```
2237  5232              JMP    PNTR1-1
2240  4442              JMS I  XPRINT      /TYPE "SET SR FOR RUN
2241  3475              M3-1               /AND CONT
2242  7402              HLT                /HALT FOR SWITCHES
2243  7300              CLA CLL
2244  3030    START2,   DCA    TYPFLG      /CLEAR ERROR FLAG      /CLEAR TYPE FLAG
2245  5646              JMP I  .+1         /GO TO FIRST TEST
2246  0400              INIT1

                        /INITIALIZATION CONSTANTS AND VARIABLES
                        /
2247  0000    IOTS,
              TIOT,     0                  /BASIC IOT
2250  0262              DBDIX+1
2251  0267              DBEIX+1
2252  0274              DBSKX+1
2253  0301              DBCIX+1
2254  0306              DBRIX+1
2255  0313              DBCOX+1
2256  0320              DBSOX+1
2257  0325              DBROX+1
2260  3650    DIOT,     DCA I  TIOT

                        /IOT SUBROUTINES
                        /
                        /DISABLE DATA BUFFER INTERRUPT (DBDI,65X0)
                        /
2261  0000    DBDIX,    0
2262  6500              6500

2263  7410              SKP                /TRAP FOR UNDESIRED
2264  7402              HLT                /SKIPS
2265  5661              JMP I  DBDIX

                        /ENABLE DATA BUFFER INTERRUPTS (DBEI,65X1)
                        /
2266  0000    DBEIX,    0
2267  6501              6501

2270  7410              SKP                /TRAP FOR UNDESIRED
2271  7402              HLT                /SKIPS
2272  5666              JMP I  DBEIX

                        /SKIP ON DATA BUFFER INPUT FLAG (DBSK,65X2)
                        /
2273  0000    DBSKX,    0
2274  6502              6502

2275  7410              SKP
2276  2273              ISZ    DBSKX
2277  5673              JMP I  DBSKX

                        /0S TO INPUT REGISTER CORRESPONDING
                        /(TO 1S IN AC (DBCI,65X3)
                        /
```

```
0300  0000    DBCIX,  0
0301  6503            6503

0302  7410            SKP              /TRAP FOR UNDESIRED
0303  7402            HLT              /SKIPS
0304  5700            JMP I   DBCIX
                      /
                      /INPUT REGISTER TO AC (DBRI,65X4)
0305  0000    DBRIX,  0                /
0306  6504            6504

0307  7410            SKP              /TRAP FOR UNDESIRED
0310  7402            HLT              /SKIPS
0311  5705            JMP I   DBRIX
                      /
                      /ZEROS TO OUTPUT REGISTER CORRESPONDING TO
                      /ONES IN AC (DBCO,65X5)
0312  0000    DBCOX,  0                /
0313  6505            6505

0314  7410            SKP              /TRAP FOR UNDESIRED
0315  7402            HLT              /SKIPS
0316  5712            JMP I   DBCOX
                      /
                      /1S TO OUTPUT REGISTER CORRESPONDING
                      /TO 1S IN AC (DBSO,65X6)
0317  0000    DBSOX,  0                /
0320  6506            6506

0321  7410            SKP              /TRAP FOR UNDESIRED
0322  7402            HLT              /SKIPS
0323  5717            JMP I   DBSOX
                      /
                      /JAM TRANSFER OUTPUT REGISTER TO AC (DBRO 65X7)
0324  0000    DBROX,  0                /
0325  6507            6507

0326  7410            SKP              /TRAP FOR UNDESIRED
0327  7402            HLT              /SKIPS
0330  5724            JMP I   DBROX
0375  7770
0376  6500
0377  0007
0400  0400    PAGE
                      /
                      /IS OUTPUT REGISTER CLEARED BY INITIALIZE?
                      /
```

```
0400  3030  INIT1,  DCA   TYPFLG      /CLEAR ERROR FLAG
0401  3031          DCA   LPCNT       /SET ITERATION COUNT TO 4096(DECIMAL)
0402  6007          CAF               /INITIALIZE INTERFACE
0403  4441          DBRO              /READ OUTPUT REGISTER
0404  3021          DCA   DATA1       /SAVE REGISTER DATA
0405  1021          TAD   DATA1       /GET REGISTER DATA
0406  7650          SNA CLA           /WAS REGISTER CLEARED BY INITIALIZE
0407  5214          JMP   .+5         /DATA CORRECT, CONTINUE
0410  4444          JMS I XERROR      /NO, ERROR
0411  3645          INIT1E-1          /"OUTPUT REGISTER NOT CLEARED"
0412  3515          DH1-1             /"REGISTER DATA"
0413  7777          -1                /NUMBER OF WORDS TO BE OUTPUT
0414  4445          JMS I XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
0415  5202          JMP   INIT1+2     /LOOP ON CURRENT TEST
                /
                /IS INPUT REGISTER CLEARED BY INITIALIZE?
                /
0416  3030  INIT2,  DCA   TYPFLG      /CLEAR ERROR FLAG
0417  3031          DCA   LPCNT       /SET ITERATION COUNT TO 4096(DECIMAL)
0420  7410          SKP
0421  6007          CAF               /INITIALIZE INTERFACE
0422  4436          DBRI              /READ INPUT REGISTER
0423  3021          DCA   DATA1       /SAVE REGISTER DATA
0424  1021          TAD   DATA1       /GET REGISTER DATA
0425  7650          SNA CLA           /WAS REGISTER CLEARED
0426  5233          JMP   .+5         /DATA CORRECT, CONTINUE
0427  4444          JMS I XERROR      /NO, ERROR
0430  3661          INIT2E-1          /"INPUT REGISTER NOT CLEARED"
0431  3515          DH1-1             /"REGISTER DATA"
0432  7777          -1                /NUMBER OF WORDS TO BE OUTPUT
0433  4445          JMS I XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
0434  5221          JMP   INIT2+3     /LOOP ON CURRENT TEST
                /
                /IS SKIP FLAG SET AFTER INITIALIZE
                /
0435  3030  INIT3,  DCA   TYPFLG      /CLEAR ERROR FLAG
0436  3031          DCA   LPCNT       /SET ITERATION COUNT TO 4096(DECIMAL)
0437  7410          SKP
0440  6007          CAF               /INITIALIZE INTERFACE
0441  4433          DBEI              /ENABLE INTERFACE INTERRUPTS
0442  6003          SRQ               /TEST FOR INTERRUPT ACTIVE
0443  5250          JMP   .+5         /NO INTERRUPT, CONTINUE
0444  4444          JMS I XERROR      /INTERRUPT ACTIVE, ERROR
0445  4042          INT1E-1           /"INTERRUPT ACTIVE"
0446  3514          DH0-1             /NO DATA HEADER
0447  0000          0                 /NO DATA
0450  4434          DBSK              /IS INTERFACE FLAG SET
0451  5256          JMP   .+5         /FLAG NOT SET, CONTINUE
0452  4444          JMS I XERROR      /FLAG SET, ERROR
0453  3674          INIT3E-1          /"SKIP FLAG SET"
0454  3514          DH0-1             /NO DATA HEADER
0455  0000          0                 /NO DATA
0456  4445          JMS I XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
0457  5240          JMP   INIT3+3     /LOOP ON CURRENT TEST
```

```
                /DOES OUTPUT REGISTER JAM TRANSFER TO AC?
                /
0460    3030    TRAN1,  DCA     TYPFLG      /CLEAR ERROR FLAG
0461    3031            DCA     LPCNT       /SET ITERATION COUNT TO 4096(DECIMAL)
0462    6007            CAF                 /INITIALIZE INTERFACE
0463    7340            CLA CLL CMA         /SET AC =7777
0464    4441            DBRO                /READ OUTPUT REGISTER
0465    3021            DCA     DATA1       /SAVE AC CONTENTS
0466    1021            TAD     DATA1       /GET AC CONTENTS
0467    7650            SNA CLA             /WAS AC CLEARED BY TRANSFER
0470    5275            JMP     .+5         /DATA CORRECT, CONTINUE
0471    4444            JMS I   XERROR      /NO, ERROR
0472    3703            TRAN1E-1            /"DBRO DID NOT CLEAR AC"
0473    3525            DH2-1               /"AC CONTENTS"
0474    7777            -1                  /NUMBER OF WORDS TO BE OUTPUT
0475    4445            JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
0476    5262            JMP     TRAN1+2     /LOOP ON CURRENT TEST

                /DOES INPUT REGISTER JAM TRANSFER TO AC
                /
0477    3030    TRAN2,  DCA     TYPFLG      /CLEAR ERROR FLAG
0500    3031            DCA     LPCNT       /SET ITERATION COUNT TO 4096(DECIMAL)
0501    6007            CAF                 /INITIALIZE INTERFACE
0502    7340            CLA CLL CMA         /SET AC =7777
0503    4436            DBRI                /READ INPUT REGISTER
0504    3021            DCA     DATA1       /SAVE AC CONTENTS
0505    1021            TAD     DATA1       /GET AC CONTENTS
0506    7650            SNA CLA             /WAS AC CLEARED BY TRANSFER
0507    5314            JMP     .+5         /DATA CORRECT, CONTINUE
0510    4444            JMS I   XERROR      /NO, ERROR
0511    3716            TRAN2E-1            /"DBRI DID NOT CLEAR AC"
0512    3525            DH2-1               /"AC CONTENTS"
0513    7777            -1                  /NUMBER OF WORDS TO BE OUTPUT
0514    4445            JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
0515    5301            JMP     TRAN2+2     /LOOP ON CURRENT TEST

                /DOES TRANSFER TO OUTPUT REGISTER CHANGE AC (WITH AC=7777,DBSO)
                /
0516    3030    TRAN3,  DCA     TYPFLG      /CLEAR ERROR FLAG
0517    3031            DCA     LPCNT       /SET ITERATION COUNT TO 4096(DECIMAL)
0520    6007            CAF                 /INITIALIZE INTERFACE
0521    7340            CLA CLL CMA         /SET AC =7777
0522    4440            DBSO                /BIT SET OUTPUT REGISTER
0523    3021            DCA     DATA1       /SAVE AC CONTENTS
0524    1021            TAD     DATA1       /GET AC CONTENTS
0525    7040            CMA                 /COMPLIMENT DATA TO TEST FOR 7777
0526    7650            SNA CLA             /DID AC CHANGE
0527    5334            JMP     .+5         /DATA CORRECT, CONTINUE
0530    4444            JMS I   XERROR      /NO, ERROR
0531    3731            TRAN3E-1            /"DBSO CHANGED AC"
0532    3525            DH2-1               /"AC CONTENTS"
0533    7777            -1                  /NUMBER OF WORDS TO BE OUTPUT
0534    4445            JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
0535    5320            JMP     TRAN3+2     /LOOP ON CURRENT TEST
```

```
                /DOES TRANSFER TO OUTPUT REGISTER CHANGE AC (WITH AC=7777, DBCO)

0536 3030  TRAN4,  DCA     TYPFLG      /CLEAR ERROR FLAG
0537 3031          DCA     LPCNT       /SET ITERATION COUNT TO 4096(DECIMAL)
0540 6007          CAF                 /INITIALIZE INTERFACE
0541 7340          CLA CLL CMA         /SET AC =7777
0542 4437          DBCO                /BIT CLEAR OUTPUT REGISTER
0543 3021          DCA     DATA1       /SAVE AC CONTENTS
0544 1021          TAD     DATA1       /GET AC CONTENTS
0545 7040          CMA                 /COMPLIMENT DATA TO TEST FOR 7777
0546 7650          SNA CLA             /DID AC CHANGE
0547 5354          JMP     .+5         /DATA CORRECT, CONTINUE
0550 4444          JMS I   XERROR      /NO, ERROR
0551 3741          TRAN4E-1            /"DBCO CHANGED AC"
0552 3525          DH2-1               /"AC CONTENTS"
0553 7777          -1                  /NUMBER OF WORDS TO BE OUTPUT
0554 4445          JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
0555 5340          JMP     TRAN4+2     /LOOP ON CURRENT TEST

                /DOES TRANSFER TO INPUT REGISTER CHANGE AC (WITH AC=7777, DBCI)

0556 3030  TRAN5,  DCA     TYPFLG      /CLEAR ERROR FLAG
0557 3031          DCA     LPCNT       /SET ITERATION COUNT TO 4096(DECIMAL)
0560 6007          CAF                 /INITIALIZE INTERFACE
0561 7340          CLA CLL CMA         /SET AC =7777
0562 4435          DBCI                /BIT CLEAR INPUT REGISTER
0563 3021          DCA     DATA1       /SAVE AC CONTENTS
0564 1021          TAD     DATA1       /GET AC CONTENTS
0565 7040          CMA                 /COMPLIMENT DATA TO TEST FOR 7777
0566 7650          SNA CLA             /DID AC CHANGE
0567 5374          JMP     .+5         /DATA CORRECT, CONTINUE
0570 4444          JMS I   XERROR      /NO, ERROR
0571 3751          TRAN5E-1            /"DBCI CHANGED AC"
0572 3525          DH2-1               /"AC CONTENTS"
0573 7777          -1                  /NUMBER OF WORDS TO BE OUTPUT
0574 4445          JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
0575 5360          JMP     TRAN5+2     /LOOP ON CURRENT TEST
0576 5777'         JMP     TRAN6       /GO TO NEXT TEST
0577
2600 0600          PAGE

                /DOES TRANSFER TO OUTPUT REGISTER CHANGE AC (WITH AC=0,DBSO)

2620 3030  TRAN6,  DCA     TYPFLG      /CLEAR ERROR FLAG
2621 3031          DCA     LPCNT       /SET ITERATION COUNT TO 4096 (DECIMAL)
2622 6007          CAF                 /INITIALIZE INTERFACE
2623 4440          DBSO                /BIT SET OUTPUT REGISTER
2624 3021          DCA     DATA1       /SAVE AC CONTENTS
2625 1021          TAD     DATA1       /GET AC CONTENTS
2626 7650          SNA CLA             /WAS AC CHANGED
2627 5214          JMP     .+5         /DATA CORRECT, CONTINUE
```

```
0610  4444            JMS I  XERROR       /AC CHANGED, ERROR
0611  3731            TRAN3E-1            /"DBSO CHANGED AC"
0612  3525            DH2-1              /"AC CONTENTS"
0613  7777            -1                 /NUMBER OF WORDS TO BE OUTPUT
0614  4445            JMS I  XLOOP1       /CHECK FOR LOOP ON CURRENT TEST
0615  5202            JMP    TRAN6+2      /LOOP ON CURRENT TEST
              /
              /DOES TRANSFER TO OUTPUT REGISTER CHANGE AC (WITH AC=0,DBCO)
              /
0616  3030   TRAN7,   DCA    TYPFLG       /CLEAR ERROR FLAG
0617  3031            DCA    LPCNT        /SET ITERATION COUNT TO 4096 (DECIMAL)
0620  6007            CAF                 /INITIALIZE INTERFACE
0621  4437            DBCO                /BIT CLEAR OUTPUT REGISTER
0622  3021            DCA    DATA1        /SAVE AC CONTENTS
0623  1021            TAD    DATA1        /GET AC CONTENTS
0624  7650            SNA CLA             /IS AC STILL 0
0625  5232            JMP    .+5          /DATA CORRECT, CONTINUE
0626  4444            JMS I  XERROR       /NO, ERROR
0627  3741            TRAN4E-1            /"DBCO CHANGED AC"
0630  3525            DH2-1              /"AC CONTENTS"
0631  7777            -1                 /NUMBER OF WORDS TO BE OUTPUT
0632  4445            JMS I  XLOOP1       /CHECK FOR LOOP ON CURRENT TEST
0633  5220            JMP    TRAN7+2      /LOOP ON CURRENT TEST
              /
              /DOES TRANSFER TO INPUT REGISTER CHANGE AC (WITH AC=0, DBCI)
              /
0634  3030   TRAN8,   DCA    TYPFLG       /CLEAR ERROR FLAG
0635  3031            DCA    LPCNT        /SET ITERATION COUNT TO 4096 (DECIMAL)
0636  6007            CAF                 /INITIALIZE INTERFACE
0637  4435            DBCI                /BIT CLEAR INPUT REGISTER
0640  3021            DCA    DATA1        /SAVE AC CONTENTS
0641  1021            TAD    DATA1        /GET AC CONTENTS
0642  7650            SNA CLA             /IS AC STILL 0
0643  5250            JMP    .+5          /DATA CORRECT, CONTINUE
0644  4444            JMS I  XERROR       /AC CHANGED, ERROR
0645  3751            TRAN5E-1            /"DBCI CHANGED AC"
0646  3525            DH2-1              /"AC CONTENTS"
0647  7777            -1                 /NUMBER OF WORDS TO BE OUTPUTED
0650  4445            JMS I  XLOOP1       /CHECK FOR LOOP ON CURRENT TEST
0651  5236            JMP    TRAN8+2      /LOOP ON CURRENT TEST
0652  5777'           JMP    OUT1         /GO TO NEXT TEST
0777  1000            PAGE
      1000
              /
              /CAN ALL BITS IN OUTPUT REGISTER BE SET (DBSO)
              /DOES INITIALIZE CLEAR OUTPUT REGISTER
              /
1000  3030   OUT1,    DCA    TYPFLG       /CLEAR ERROR FLAG
1001  3031            DCA    LPCNT        /SET ITERATION COUNT TO 4096 (DECIMAL)
1002  6007            CAF                 /INITIALIZE INTERFACE
1003  7340            CLA CLL CMA         /SET AC =7777
1004  4440            DBSO                /BIT SET OUTPUT REGISTER
1005  4441            DBRO                /READ OUTPUT REGISTER
1006  3021            DCA    DATA1        /SAVE REGISTER DATA
```

```
1007  1021        TAD   DATA1     /GET REGISTER DATA
1010  7040        CMA             /COMPLIMENT DATA TO TEST FOR 7777
1011  7650        SNA CLA         /IS REGISTER=7777
1012  5217        JMP   .+5       /DATA CORRECT, CONTINUE
1013  4444        JMS I XERROR    /NO, ERROR
1014  3761        OUT1E-1         /"DBSO ERROR"
1015  3515        DH1-1           /"REGISTER DATA"
1016  7777        -1              /NUMBER OF WORDS TO BE OUTPUT
1017  6007        CAF             /INITIALIZE INTERFACE
1020  4441        DBRO            /READ OUTPUT REGISTER
1021  3021        DCA   DATA1     /SAVE REGISTER DATA
1022  1021        TAD   DATA1     /GET REGISTER DATA
1023  7650        SNA CLA         /WAS REGISTER CLEARED
1024  5231        JMP   .+5       /DATA CORRECT, CONTINUE
1025  4444        JMS I XERROR    /NO, ERROR
1026  3645        INIT1E-1        /"OUTPUT REG NOT CLEARED"
1027  3515        DH1-1           /"REGISTER DATA"
1030  7777        -1              /NUMBER OF WORDS TO BE OUTPUT
1031  4445        JMS I XLOOP1    /CHECK FOR LOOP ON CURRENT TEST
1032  5202        JMP   OUT1+2    /LOOP ON CURRENT TEST

            /CAN ALL BITS OF OUTPUT REGISTER BE CLEARED (DBCO)

1033  3030  OUT2, DCA   TYPFLG    /CLEAR ERROR FLAG
1034  3031        DCA   LPCNT     /SET ITERATION COUNT TO 4096(DECIMAL)
1035  7340        CLA CLL CMA     /SET AC =7777
1036  4440        DBSO            /BIT SET OUTPUT REGISTER
1037  4437        DBCO            /BIT CLEAR OUTPUT REGISTER
1040  7300        CLA CLL
1041  4441        DBRO            /READ OUTPUT REGISTER
1042  3021        DCA   DATA1     /SAVE REGISTER DATA
1043  1021        TAD   DATA1     /GET REGISTER DATA
1044  7650        SNA CLA         /WAS OUTPUT REGISTER CLEARED
1045  5252        JMP   .+5       /DATA CORRECT, CONTINUE
1046  4444        JMS I XERROR    /NO, ERROR
1047  3645        INIT1E-1        /"OUTPUT REGISTER NOT CLEARED"
1050  3515        DH1-1           /"REGISTER DATA"
1051  7777        -1              /NUMBER OF WORDS TO BE OUTPUT
1052  4445        JMS I XLOOP1    /CHECK FOR LOOP ON CURRENT TEST
1053  5235        JMP   OUT2+2    /LOOP ON CURRENT TEST

            /CAN EACH BIT OF OUTPUT REGISTER BE SET
            /INDEPENDENTLY (DBSO)

1054  3030  OUT3, DCA   TYPFLG    /CLEAR ERROR FLAG
1055  1177        TAD   C-62      /SET ITERATION COUNT
1056  3031        DCA   LPCNT     /TO 50(DECIMAL)
1057  3021        DCA   DATA1     /CLEAR TEST DATA
1060  6007 OUT3A, CAF             /INITIALIZE INTERFACE
1061  1021        TAD   DATA1     /GET TEST DATA
1062  4440        DBSO            /BIT SET OUTPUT REGISTER
1063  7300        CLA CLL
1064  4441        DBRO            /READ OUTPUT REGISTER
1065  3022        DCA   DATA2     /SAVE REGISTER DATA
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```
1066 1021          TAD    DATA1      /GET TEST DATA
1067 7041          CIA
1070 1022          TAD    DATA2      /COMPARE TO REGISTER CONTENTS
1071 7650          SNA CLA           /DO THEY COMPARE
1072 5277          JMP    .+5        /DATA CORRECT, CONTINUE
1073 4444          JMS I  XERROR     /NO, ERROR
1074 3761          OUT1E-1           /"DBSO ERROR"
1075 3560          DH4-1             /"EXPECTED RECEIVED"
1076 7776          -2                /NUMBER OF WORDS TO BE OUTPUT
1077 4446          JMS I  XLOOP2     /TEST FOR LOOP ON SAME DATA,ESCAPE ON DATA ERROR
1100 5260          JMP    OUT3A      /LOOP WITH SAME DATA
1101 2021          ISZ    DATA1      /INCREMENT DATA PATTERN
1102 5260          JMP    OUT3A      /CONTINUE TEST
1103 4445          JMS I  XLOOP1     /CHECK FOR LOOP ON CURRENT TEST
1104 5257          JMP    OUT3+3     /LOOP ON CURRENT TEST
                                     /
                   /CAN EACH BIT OF OUTPUT REGISTER BE CLEARED
                   /INDEPENDENTLY (DBCO)
                                     /
1105 3030   OUT4,  DCA    TYPFLG     /CLEAR ERROR FLAG
1106 1177          TAD    [-62       /SET ITERATION COUNT
1107 3031          DCA    LPCNT      /TO 50(DECIMAL)
1110 3021          DCA    DATA1      /CLEAR TEST DATA
1111 6007   OUT4A, CAF               /INITIALIZE INTERFACE
1112 1021          TAD    DATA1      /GET MASK
1113 7040          CMA               /COMPLIMENT TO GET EXPECTED RESULT
1114 3022          DCA    DATA2      /SAVE EXPECTED RESULT
1115 7040          CMA
1116 4440          DBSO              /SET OUTPUT REGISTER TO 7777
1117 7300          CLA CLL           /BIT SET OUTPUT REGISTER
1120 1021          TAD    DATA1      /GET PATTERN TO CLEAR OUTPUT REGISTER
1121 4437          DBCO              /BIT CLEAR OUTPUT REGISTER
1122 4441          DBRO              /READ OUTPUT REGISTER
1123 3023          DCA    DATA3      /SAVE REGISTER DATA
1124 1022          TAD    DATA2      /GET EXPECTED RESULT
1125 7041          CIA
1126 1023          TAD    DATA3      /COMPARE TO RECEIVED DATA
1127 7650          SNA CLA           /WERE CORRECT BITS IN OUTPUT REGISTER CLEARED
1130 5335          JMP    .+5        /DATA CORRECT, CONTINUE
1131 4444          JMS I  XERROR     /NO, ERROR
1132 3767          OUT4E-1           /"DBCO ERROR"
1133 3534          DH3-1             /MASK EXPECTED RECEIVED
1134 7775          -3                /NUMBER OF WORDS TO BE OUTPUT
1135 4446          JMS I  XLOOP2     /TEST FOR LOOP ON SAME DATA,ESCAPE ON DATA ERROR
1136 5311          JMP    OUT4A      /LOOP WITH SAME DATA
1137 2021          ISZ    DATA1      /INCREMENT DATA PATTERN
1140 5311          JMP    OUT4A      /CONTINUE TEST
1141 4445          JMS I  XLOOP1     /CHECK FOR LOOP ON CURRENT TEST
1142 5310          JMP    OUT4+3     /LOOP ON CURRENT TEST
1143 5777,         JMP    OUT5
1177 1200
1200        PAGE
```

/
/WITH OUTPUT REGISTER CLEARED, DOES CLEARING
/OUTPUT REGISTER CHANGE ANY BIT IN OUTPUT

```
                              /
1200  3030  OUT5,   DCA     TYPFLG      /CLEAR ERROR FLAG
1201  1177          TAD     C-52        /SET ITERATION COUNT
1202  3031          DCA     LPCNT       /TO 50 (DECIMAL)
1203  3021          DCA     DATA1       /CLEAR TEST DATA
1204  3022          DCA     DATA2       /CLEAR EXPECTED RESULT
1205  6007  OUT5A,  CAF                 /INITIALIZE INTERFACE
1206  1021          TAD     DATA1       /GET TEST DATA
1207  4437          DBCO                /BIT CLEAR OUTPUT REGISTER

1210  7300          CLA CLL
1211  4441          DBRO                /READ OUTPUT REGISTER
1212  3023          DCA     DATA3       /SAVE REGISTER DATA
1213  1023          TAD     DATA3       /GET REGISTER DATA
1214  7650          SNA CLA             /IS OUTPUT REGISTER 2
1215  5222          JMP     .+5         /DATA CORRECT, CONTINUE
1216  4444          JMS I   XERROR      /NO, ERROR
1217  3767          OUT4E-1             /"DBCO ERROR"
1220  3534          DH3-1               /"MASK EXPECTED RECEIVED"
1221  7775          -3                  /NUMBER OF DATA WORDS
1222  4446          JMS I   XLOOP2      /TEST FOR LOOP ON SAME DATA
1223  5205          JMP     OUT5A       /LOOP WITH SAME DATA
1224  2021          ISZ     DATA1       /INCREMENT DATA PATTERN
1225  5205          JMP     OUT5A       /CONTINUE
1226  4445          JMS I   XLOOP1      /CHECH FOR LOOP ON CURRENT TEST
1227  5203          JMP     OUT5+3      /LOOP ON CURRENT TEST

                              /DOES SETTING OUTPUT REGISTER TWICE WITH SAME
                              /DATA CHANGE OUTPUT REGISTER

1230  3030  OUT6,   DCA     TYPFLG      /CLEAR ERROR FLAG
1231  1177          TAD     C-62        /SET ITERATION COUNT
1232  3031          DCA     LPCNT       /TO 50 (DECIMAL)
1233  3021          DCA     DATA1       /CLEAR TEST DATA
1234  6007  OUT6A,  CAF                 /INITIALIZE INTERFACE
1235  1021          TAD     DATA1       /GET TEST DATA
1236  4440          DBSO                /BIT SET OUTPUT REGISTER
1237  4440          DBSO                /BIT SET OUTPUT REGISTER

1240  7300          CLA CLL
1241  4441          DBRO                /READ OUTPUT REGISTER
1242  3022          DCA     DATA2       /SAVE REGISTER DATA
1243  1021          TAD     DATA1       /GET TEST DATA
1244  7041          CIA                 /COMPARE TO REGISTER DATA
1245  1022          TAD     DATA2       /ARE THEY THE SAME
1246  7650          SNA CLA             /DATA CORRECT, CONTINE
1247  5254          JMP     .+5         /NO, ERROR
1250  4444          JMS I   XERROR      /"DBSO ERROR"
1251  3767          OUT4E-1             /"EXPECTED RECEIVED"
1252  3560          DH4-1               /NUMBER OF DATA WORDS
1253  7776          -2                  /TEST FOR LOOP ON SAME DATA
1254  4446          JMS I   XLOOP2      /LOOP WITH SAME DATA
1255  5234          JMP     OUT6A       /INCREMENT DATA PATTERN
1256  2021          ISZ     DATA1       /CONTINUE
1257  5234          JMP     OUT6A
1260  4445          JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
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1261  5233          JMP     OUT6+3      /LOOP ON CURRENT TEST

                    /
                    /DOES READING OUTPUT REGISTER TWICE CHANGE
                    /OUTPUT REGISTER

1262  3030   OUT7,  DCA     TYPFLG      /CLEAR ERROR FLAG
1263  1177          TAD     C-62        /SET ITERATION COUNT
1264  3031          DCA     LPCNT       /TO 50 (DECIMAL)
1265  3021          DCA     DATA1       /CLEAR TEST DATA
1266  6007   OUT7A, CAF                 /INITIALIZE INTERFACE
1267  1021          TAD     DATA1       /GET TEST DATA
1270  4440          DBSO                /BIT SET OUTPUT REGISTER
1271  7300          CLA CLL
1272  4441          DBRO                /READ OUTPUT REGISTER
1273  7300          CLA CLL
1274  4441          DBRO                /READ OUTPUT REGISTER
1275  3022          DCA     DATA2       /SAVE REGISTER DATA
1276  1021          TAD     DATA1       /GET TEST DATA
1277  7041          CIA
1300  1022          TAD     DATA2       /COMPARE TO REGISTER DATA
1301  7650          SNA CLA             /ARE THEY THE SAME
1302  5307          JMP     .+5         /DATA CORRECT, CONTINUE
1303  4444          JMS I   XERROR      /NO, ERROR
1304  3775          OUT7E-1             /"DBRO ERROR"
1305  3560          DH4-1               /NUMBER OF DATA WORDS
1306  7776          -2                  /"EXPECTED RECEIVED"
1307  4446          JMS I   XLOOP2      /TEST FOR LOOP WITH SAME DATA
1310  5266          JMP     OUT7A       /LOOP WITH SAME DATA
1311  2021          ISZ     DATA1       /INCREMENT DATA PATTERN
1312  5266          JMP     OUT7A       /CONTINUE
1313  4445          JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
1314  5265          JMP     OUT7+3      /LOOP ON CURRENT TEST

                    /
                    /DOES CLEARING OUTPUT REGISTER TWICE
                    /CHANGE ANY BIT IN OUTPUT REGISTER

1315  3030   OUT8,  DCA     TYPFLG      /CLEAR ERROR FLAG
1316  1177          TAD     C-62        /SET ITERATION COUNT
1317  3031          DCA     LPCNT       /TO 50 (DECIMAL)
1320  3021          DCA     DATA1       /CLEAR TEST DATA
1321  3022          DCA     DATA2       /CLEAR EXPECTED RESULT
1322  6007   OUT8A, CAF                 /INITIALIZE INTERFACE
1323  1021          TAD     DATA1       /GET TEST DATA
1324  4440          DBSO                /BIT SET OUTPUT REGISTER
1325  4437          DBCO                /BIT CLEAR OUTPUT REGISTER
1326  4437          DBCO                /BIT CLEAR OUTPUT REGISTER
1327  7300          CLA CLL
1330  4441          DBRO                /READ OUTPUT REGISTER
1331  3023          DCA     DATA3       /SAVE REGISTER DATA
1332  1023          TAD     DATA3       /GET REGISTER DATA
1333  7650          SNA CLA             /IS REGISTER 0
1334  5341          JMP     .+5         /DATA CORRECT, CONTINUE
1335  4444          JMS I   XERROR      /NO, ERROR
```

```
1336  3767            OUT4E-1          /"DBCO ERROR"
1337  3534            DH3-1            /"MASK EXPECTED RECEIVED"
1340  7775            -3               /NUMBER OF DATA WORDS
1341  4446            JMS I  XLOOP2    /TEST FOR LOOP WITH SAME DATA
1342  5322            JMP    OUT8A     /LOOP WITH SAME DATA
1343  2021            ISZ    DATA1     /INCREMENT DATA PATTERN
1344  5322            JMP    OUT8A     /CONTINUE
1345  4445            JMS I  XLOOP1    /CHECK FOR LOOP ON CURRENT TEST
1346  5320            JMP    OUT8+3    /LOOP ON CURRENT TEST
1347  5777,           JMP    IN1
1377  1400
1400  1400            PAGE

                      /CAN ALL BITS IN INPUT REGISTER BE SET
                      /DOES INITIALIZE CLEAR INPUT REGISTER

1400  3030    IN1,    DCA    TYPFLG    /CLEAR ERROR FLAG
1401  3031            DCA    LPCNT     /SET ITERATION COUNT TO 4096(DECIMAL)
1402  6007            CAF              /INITIALIZE INTERFACE
1403  7340    IN1A,   CLA CLL CMA      /SET AC =7777
1404  4440            DBSO             /BIT SET OUTPUT REGISTER
1405  7300            CLA CLL
1406  4436            DBRI             /READ INPUT REGISTER
1407  3021            DCA    DATA1     /SAVE REGISTER DATA
1410  1021            TAD    DATA1     /GET REGISTER DATA
1411  7040            CMA              /COMPLIMENT TO TEST FOR 7777
1412  7650            SNA CLA          /WAS INPUT REGISTER SET TO 7777
1413  5220            JMP    .+5       /DATA CORRECT, CONTINUE
1414  4444            JMS I  XERROR    /NO, ERROR
1415  4011            IN3E-1           /"INPUT REGISTER NOT CORRECT"
1416  3515            DH1-1            /"REGISTER DATA"
1417  7777            -1               /NUMBER OF WORDS TO BE OUTPUT
1420  6007    IN1B,   CAF              /INITIALIZE INTERFACE
1421  4436            DBRI             /READ INPUT REGISTER
1422  3021            DCA    DATA1     /SAVE REGISTER DATA
1423  1021            TAD    DATA1
1424  7650            SNA CLA
1425  5232            JMP    .+5       /DATA CORRECT, CONTINUE
1426  4444            JMS I  XERROR    /NO, ERROR
1427  3661            INIT2E-1         /"INPUT REGISTER NOT CLEARED"
1430  3515            DH1-1            /"REGISTER DATA"
1431  7777            -1               /NUMBER OF WORDS TO BE OUTPUT
1432  4445            JMS I  XLOOP1    /CHECK FOR LOOP ON CURRENT TEST
1433  5203            JMP    IN1A      /LOOP ON CURRENT TEST

                      /CAN ALL BITS IN INPUT REGISTER BE CLEARED (DBCI)

1434  3030    IN2,    DCA    TYPFLG    /CLEAR ERROR FLAG
1435  3031            DCA    LPCNT     /SET ITERATION COUNT TO 4096(DECIMAL)
1436  6007            CAF              /INITIALIZE INTERFACE
1437  7340            CLA CLL CMA      /SET AC =7777
1440  0027            AND    FJUMPER   /MASK TO TEST ONLY FLIPFLOP BITS
1441  3021            DCA    DATA1     /SAVE MASK
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1442  3022          DCA    DATA2      /SAVE EXPECTED RESULT
1443  1021          TAD    DATA1      /GET MASK
1444  4440          DBSO              /BIT SET OUTPUT REGISTER
1445  4435          DBCI              /BIT CLEAR INPUT REGISTER
1446  7300          CLA CLL
1447  4436          DBRI              /READ INPUT REGISTER
1450  3023          DCA    DATA3      /SAVE REGISTER DATA
1451  1023          TAD    DATA3      /COMPARE TO REGISTER DATA
1452  7650          SNA CLA           /WERE CORRECT BITS CLEARED
1453  5260          JMP    .+5        /DATA CORRECT, CONTINUE
1454  4444          JMS I  XERROR     /NO, ERROR
1455  4003          IN2E-1            /"DBCI ERROR"
1456  3534          DH3-1             /"MASK EXPECTED RECEIVED"
1457  7775          -3                /NUMBER OF WORDS TO BE OUTPUT
1460  4445          JMS I  XLOOP1     /CHECK FOR LOOP ON CURRENT TEST
1461  5236          JMP    IN2+2      /LOOP ON CURRENT TEST

                    /CAN EACH BIT OF INPUT REGISTER BE SET INDEPENDENTLY

1462  3030   IN3,   DCA    TYPFLG     /CLEAR ERROR FLAG
1463  1177          TAD    C-62       /SET ITERATION COUNT
1464  3031          DCA    LPCNT      /TO 50(DECIMAL)
1465  3021          DCA    DATA1      /CLEAR TEST DATA
1466  6007   IN3A,  CAF               /INITIALIZE INTERFACE
1467  1021          TAD    DATA1      /GET TEST DATA
1470  4440          DBSO              /BIT SET OUTPUT REGISTER
1471  7300          CLA CLL
1472  4436          DBRI              /READ INPUT REGISTER
1473  3022          DCA    DATA2      /SAVE REGISTER DATA
1474  1021          TAD    DATA1      /GET TEST DATA
1475  7041          CIA
1476  1022          TAD    DATA2      /COMPARE TO RECEIVED DATA
1477  7650          SNA CLA           /ARE THEY THE SAME
1500  5305          JMP    .+5        /DATA CORRECT, CONTINUE
1501  4444          JMS I  XERROR     /NO, ERROR
1502  4011          IN3E-1            /"INPUT REGISTER DATA ERROR"
1503  3560          DH4-1             /"EXPECTED RECEIVED"
1504  7776          -2                /NUMBER OF WORDS TO BE OUTPUT
1505  4446          JMS I  XLOOP2     /TEST FOR LOOP ON SAME DATA,ESCAPE ON DATA ERROR
1506  5266          JMP    IN3A       /LOOP WITH SAME DATA
1507  2021          ISZ    DATA1      /INCREMENT DATA PATTERN
1510  5266          JMP    IN3A       /CONTINUE TEST
1511  4445          JMS I  XLOOP1     /CHECK FOR LOOP ON CURRENT TEST
1512  5265          JMP    IN3+3      /LOOP ON CURRENT TEST
1513  5777          JMP    IN5
1577  1600          PAGE
      1600

                    /VERIFY THAT ALL LATCHING INPUT LINES HOLD DATA

1600  3030   IN5,   DCA    TYPFLG     /CLEAR ERROR FLAG
1601  1177          TAD    C-62       /SET ITERATION COUNT
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1602  3031          DCA   LPCNT       /TO 50(DECIMAL)
1603  3023          DCA   DATA3       /CLEAR TEST DATA
1604  6007  IN5A,   CAF               /INITIALIZE INTERFACE
1605  1023          TAD   DATA3       /GET TEST DATA
1606  2027          AND   FJUMPER     /MASK OFF NON LATCHING BITS
1607  3021          DCA   DATA1       /SAVE AS EXPECTED RESULT
1610  1021          TAD   DATA1       /GET TEST DATA
1611  7450          SNA               /ARE ANY BITS TO BE TESTED
1612  5233          JMP   IN5C        /NO, GET NEXT DATA WORD
1613  4440          DBSO              /BIT SET OUTPUT REGISTER
1614  4437          DBCO              /BIT CLEAR OUTPUT REGISTER
1615  7300          CLA CLL
1616  4436          DBRI              /READ INPUT REGISTER
1617  3022          DCA   DATA2       /SAVE REGISTER DATA
1620  1021          TAD   DATA1       /GET EXPECTED RESULT
1621  7041          CIA
1622  1022          TAD   DATA2       /COMPARE TO RECEIVED DATA
1623  7650          SNA CLA           /ARE THEY THE SAME
1624  5231          JMP   .+5         /DATA CORRECT, CONTINUE
1625  4444          JMS I XERROR      /NO, ERROR
1626  4026          IN4E-1            /"LATCH ERROR"
1627  3560          DH4+1             /"EXPECTED RECEIVED"
1630  7776          -2                /NUMBER OF WORDS TO BE OUTPUT
1631  4446          JMS I XLOOP2      /TEST FOR LOOP ON SAME DATA,ESCAPE ON DATA ERROR
1632  5204          JMP   IN5A        /LOOP ON SAME DATA
1633  2023  IN5C,   ISZ   DATA3       /INCREMENT DATA PATTERN
1634  5204          JMP   IN5A        /CONTINUE TEST
1635  4445          JMS I XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
1636  5203          JMP   IN5+3       /LOOP ON CURRENT TEST

            /VERIFY ALL NON LATCHING DATA BITS DO NOT HOLD DATA

1637  3030  IN6,    DCA   TYPFLG      /CLEAR ERROR FLAG
1640  1177          TAD   C-62        /SET ITERATION COUNT
1641  3031          DCA   LPCNT       /TO 50(DECIMAL)
1642  3024          DCA   DATA4       /CLEAR TEST DATA
1643  3022          DCA   DATA2       /CLEAR EXPECTED RESULT
1644  6007  IN6A,   CAF               /INITIALIZE INTERFACE
1645  1027          TAD   FJUMPER     /GET MASK FOR NON LATCHING BITS
1646  7040          CMA               /CHANGE TO MASK OFF LATCHING BITS
1647  0024          AND   DATA4       /SAVE FOR TRANSMISSION
1650  3021          DCA   DATA1       /GET TEST DATA
1651  1021          TAD   DATA1       /ARE ANY BITS TO BE TESTED
1652  7450          SNA
1653  5272          JMP   IN6C        /NO GET NEXT DATA WORD
1654  4440          DBSO              /BIT SET OUTPUT REGISTER
1655  4437          DBCO              /BIT CLEAR OUTPUT REGISTER
1656  7300          CLA CLL
1657  4436          DBRI              /READ INPUT REGISTER
1660  3023          DCA   DATA3       /SAVE RECEIVED DATA
1661  1023          TAD   DATA3       /GET RECEIVED DATA
1662  7650          SNA CLA           /DID ANY BITS HOLD DATA
1663  5270          JMP   .+5         /DATA CORRECT, CONTINUE
1664  4444          JMS I XERROR      /YES, ERROR
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1665   4026              IN4E-1          /"LATCH ERROR"
1666   3534              DH3-1           /"MASK EXPECTED RECEIVED"
1667   7775              -3              /NUMBER OF WORDS TO BE OUTPUT
1670   4446              JMS I   XLOOP2  /TEST FOR LOOP ON SAME DATA,ESCAPE ON DATA ERROR
1671   5244              JMP     IN6A    /LOOP WITH SAME DATA
1672   2024   IN6C,      ISZ     DATA4   /INCREMENT DATA PATTERN
1673   5244              JMP     IN6A    /CONTINUE TEST
1674   4445              JMS I   XLOOP1  /CHECK FOR LOOP ON CURRENT TEST
1675   5242              JMP     IN6+3   /LOOP ON CURRENT TEST


             /VERIFY THAT ALL LATCHING LINES CAN BE CLEARED INDEPENDENTLY
             /
1676   3030   IN7,       DCA     TYPFLG  /CLEAR ERROR FLAG
1677   1177              TAD     [-62    /SET ITERATION COUNT
1700   3031              DCA     LPCNT   /TO 50(DECIMAL)
1701   3024              DCA     DATA4   /CLEAR TEST
1702   6007              CAF             /INITIALIZE INTERFACE
1703   1027   IN7A,      TAD     FJUMPER /GET MASK FOR LATCHING BITS
1704   0024              AND     DATA4   /MASK OFF NON LATCHING BITS
1705   3021              DCA     DATA1   /SAVE FOR TRANSMISSION
1706   3022              DCA     DATA2   /EXPECTED RESULT
1707   1021              TAD     DATA1   /SET OUTPUT REGISTER=7777
1710   4440              DBSO            /BIT SET OUTPUT REGISTER
1711   4437              DBCO            /BIT CLEAR OUTPUT REGISTER
1712   7300              CLA CLL
1713   1021              TAD     DATA1   /GET TEST DATA
1714   4435              DBCI            /BIT CLEAR INPUT REGISTER
1715   7300              CLA CLL
1716   4436              DBRI            /READ INPUT REGISTER
1717   3023              DCA     DATA3   /SAVE REGISTER DATA
1720   1023              TAD     DATA3   /COMPARE TO RECEIVED DATA
1721   7650              SNA CLA         /ARE THEY THE SAME
1722   5327              JMP     .+5     /DATA CORRECT, CONTINUE
1723   4444              JMS I   XERROR  /NO, ERROR
1724   4026              IN4E-1          /"LATCH ERROR"
1725   3534              DH3-1           /"MASK EXPECTED RECEIVED"
1726   7775              -3              /NUMBER OF WORDS TO BE OUTPUT
1727   4446              JMS I   XLOOP2  /TEST FOR LOOP ON SAME DATA,ESCAPE ON DATA ERROR
1730   5302              JMP     IN7A    /LOOP WITH SAME DATA
1731   2024   IN7C,      ISZ     DATA4   /INCREMENT DATA PATTERN
1732   5302              JMP     IN7A    /CONTINUE TEST
1733   4445              JMS I   XLOOP1  /CHECK FOR LOOP ON CURRENT TEST
1734   5301              JMP     IN7+3   /LOOP ON CURRENT TEST
1735   5777'             JMP     IN8     /GO TO NEXT TEST
1777   2000
       2000   PAGE


             /WITH THE INPUT REGISTER CLEARED, DOES CLEARING
             /THE INPUT REGISTER SET ANY BIT IN INPUT
             /
2020   3030   IN8,       DCA     TYPFLG  /CLEAR ERROR FLAG
2001   1177              TAD     [-62    /SET ITERATION COUNT
```

```
2002 3031        DCA   LPCNT      /TO 50 (DECIMAL)
2003 3021        DCA   DATA1      /CLEAR TEST DATA
2004 3022        DCA   DATA2      /CLEAR EXPECTED RESULT
2005 6007  IN8A, CAF              /INITIALIZE INTERFACE
2006 1021        TAD   DATA1      /GET TEST DATA
2007 4435        DBCI             /BIT CLEAR INPUT REGISTER
2010 7300        CLA CLL
2011 4436        DBRI             /READ INPUT REGISTER
2012 3023        DCA   DATA3      /SAVE REGISTER DATA
2013 1023        TAD   DATA3      /GET REGISTER DATA
2014 7650        SNA CLA          /IS INPUT REGISTER 0
2015 5222        JMP   .+5        /DATA CORRECT, CONTINUE
2016 4444        JMS I XERROR     /NO, ERROR
2017 4003        IN8E-1           /"DBCI ERROR"
2020 3534        DH3-1            /"MASK EXPECTED RECEIVED"
2021 7775        -3               /NUMBER OF DATA WORDS
2022 4446        JMS I XLOOP2     /TEST FOR LOOP WITH SAME DATA
2023 5205        JMP   IN8A       /LOOP WITH SAME DATA
2024 2021        ISZ   DATA1      /INCREMENT DATA PATTERN
2025 5205        JMP   IN8A       /CONTINUE
2026 4445        JMS I XLOOP1     /CHECK FOR LOOP ON CURRENT TEST
2027 5203        JMP   IN8+3      /LOOP ON CURRENT TEST

           /DOES READING THE INPUT REGISTER TWICE
           /CHANGE THE INPUT REGISTER

2030 3030  IN9,  DCA   TYPFLG     /CLEAR ERROR FLAG
2031 1177        TAD   C-62       /SET ITERATION COUNT
2032 3031        DCA   LPCNT      /TO 50 (DECIMAL)
2033 3021        DCA   DATA1      /CLEAR TEST DATA
2034 6007  IN9A, CAF              /INITIALIZE INTERFACE
2035 1021        TAD   DATA1      /GET TEST DATA
2036 4440        DBSO             /BIT SET OUTPUT REGISTER
2037 7300        CLA CLL
2040 4436        DBRI             /READ INPUT REGISTER
2041 7300        CLA CLL
2042 3022        DCA   DATA2      /SAVE REGISTER DATA
2043 1021        TAD   DATA1      /GET TEST DATA
2044 7041        CIA
2045 1022        TAD   DATA2      /COMPARE TO REGISTER DATA
2046 7650        SNA CLA          /ARE THEY THE SAME
2047 5255        JMP   .+5        /DATA CORRECT, CONTINUE
2050 4444        JMS I XERROR     /NO, ERROR
2051 4034        IN9E-1           /"DBRI ERROR"
2052 3560        DH4-1            /"EXPECTED RECEIVED"
2053 7776        -2               /NUMBER OF DAT WORDS
2054 4446        JMS I XLOOP2     /TEST FOR LOOP WITH SAME DATA
2055 5234        JMP   IN9A       /LOOP WITH SAME DATA
2056 2021        ISZ   DATA1      /INCREMENT DATA PATTERN
2057 5234        JMP   IN9A       /CONTINUE
2060 4445        JMS I XLOOP1     /CHECK FOR LOOP ON CURRENT TEST
2061 5233        JMP   IN9+3      /LOOP ON CURRENT TEST
```

```
                        /DOES CLEARING INPUT REGISTER TWICE SET ANY BIT
                        /IN INPUT REGISTER
                        /
2063  3030  IN10,   DCA  TYPFLG    /CLEAR ERROR FLAG
2064  1177          TAD  C-62      /SET ITERATION COUNT
2065  3031          DCA  LPCNT     /TO 50 (DECIMAL)
2066  3022          DCA  DATA2     /CLEAR EXPECTED RESULT
2067  3021          DCA  DATA1     /CLEAR TEST DATA
2070  6007          CAF            /INITIALIZE INTERFACE
2071  1021  IN10A,  TAD  DATA1     /GET TEST DATA
2072  4440          DBSO           /BIT SET OUTPUT REGISTER
2073  4437          DBCO           /BIT CLEAR OUTPUT REGISTER
2074  4435          DBCI           /BIT CLEAR INPUT REGISTER
2075  4435          DBCI           /BIT CLEAR INPUT REGISTER
2076  7300          CLA CLL
2077  4436          DBRI           /READ INPUT REGISTER
2100  3023          DCA  DATA3     /SAVE REGISTER DATA
2101  1023          TAD  DATA3     /GET REGISTER DATA
2102  7650          SNA CLA        /IS INPUT REGISTER 0
2103  5310          JMP  .+5       /DATA CORRECT, CONTINUE
2104  4444          JMS I  XERROR  /NO, ERROR
2105  4003          IN2E-1         /"DBCI ERROR"
2106  3534          DH3-1          /"MASK EXPECTED RECEIVED"
2107  7775          -3             /NUMBER OF DATA WORDS
2110  4446          JMS I  XLOOP2  /TEST FOR LOOP WITH SAME DATA
2111  5270          JMP  IN10A     /LOOP WITH SAME DATA
2112  2021          ISZ  DATA1     /INCREMENT DATA PATTERN
2113  5270          JMP  IN10A     /CONTINUE
2114  4445          JMS I  XLOOP1  /CHECK FOR LOOP ON CURRENT TEST
2115  5266          JMP  IN10+3    /LOOP ON CURRENT TEST
2116  5777'         JMP  INOU1     /GO TO NEXT TEST
2177  2200
2200                PAGE

                        /WITH BOTH INPUT AND OUTPUT REGISTERS CLEARED
                        /DOES CLEARING OUTPUT SET
                        /ANY BIT IN INPUT
2200  3030  INOU1,  DCA  TYPFLG    /CLEAR ERROR FLAG
2201  1177          TAD  C-62      /SET ITERATION COUNT
2202  3031          DCA  LPCNT     /TO 50 (DECIMAL)
2203  3021          DCA  DATA1     /CLEAR TEST DATA
2204  3022          DCA  DATA2     /CLEAR EXPECTED RESULT
2205  6007          CAF            /INITIALIZE INTERFACE
2206  1021  INOU1A, TAD  DATA1     /GET TEST DATA
2207  4437          DBCO           /BIT CLEAR OUTPUT REGISTER
2210  7300          CLA CLL
2211  4436          DBRI           /READ INPUT REGISTER
2212  3023          DCA  DATA3     /SAVE REGISTER DATA
2213  1023          TAD  DATA3     /GET REGISTER DATA
2214  7650          SNA CLA        /IS OUTPUT REGISTER 0
2215  5222          JMP  .+5       /DATA CORRECT, CONTINUE
2216  4444          JMS I  XERROR  /NO, ERROR
```

```
2217  3767          OUT4E-1
2220  3534          DH3-1               /"DBCO ERROR"
2221  7775          -3                  /"MASK EXPECTED RECEIVED"
                                        /NUMBER OF DATA WORDS
2222  4446          JMS I   XLOOP2      /TEST FOR LOOP WITH SAME DATA
2223  5205          JMP     INOU1A      /LOOP WITH SAME DATA
2224  2021          ISZ     DATA1       /INCREMENT DATA PATTERN
2225  5205          JMP     INOU1A      /CONTINUE
2226  4445          JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
2227  5203          JMP     INOU1+3     /LOOP ON CURRENT TEST

                    /WITH BOTH INPUT AND OUTPUT REGISTERS CLEARED
                    /DOES CLEARING INPUT SET ANY BIT IN OUTPUT

2230  3030  INOU2,  DCA     TYPFLG      /CLEAR ERROR FLAG
2231  1177          TAD     C-62        /SET ITERATION COUNT
2232  3031          DCA     LPCNT       /TO 50 (DECIMAL)
2233  3021          DCA     DATA1       /CLEAR TEST DATA
2234  3022          DCA     DATA2       /CLEAR EXPECTED RESULT
2235  6007          CAF                 /INITIALIZE INTERFACE
2236  1021  INOU2A, TAD     DATA1       /GET TEST DATA
2237  4435          DBCI                /BIT CLEAR INPUT REGISTER
2240  7300          CLA CLL
2241  4441          DBRO                /READ OUTPUT REGISTER
2242  3023          DCA     DATA3       /SAVE REGISTER DATA
2243  1023          TAD     DATA3       /GET REGISTER DATA
2244  7650          SNA CLA             /IS OUTPUT REGISTER 0
2245  5252          JMP     .+5         /DATA CORRECT, CONTINUE
2246  4444          JMS I   XERROR      /NO, ERROR
2247  4003          IN2E-1              /"DBCI ERROR"
2250  3534          DH3-1               /"MASK EXPECTED RECEIVED"
2251  7775          -3                  /NUMBER OF DATAA WORDS
2252  4446          JMS I   XLOOP2      /TEST FOR LOOP WITH CURRENT DATA
2253  5235          JMP     INOU2A      /LOOP WITH SAME DATA
2254  2021          ISZ     DATA1       /INCREMENT DATA PATTERN
2255  5235          JMP     INOU2A      /CONTINUE
2256  4445          JMS I   XLOOP1      /CHECK FOR LOOP ON CURRENT TEST
2257  5233          JMP     INOU2+3     /LOOP ON CURRENT TEST

                    /WITH THE OUTPUT REGISTER SET TO ALL 1S, AND
                    /THE INPUT REGISTER CLEARED, DOES SELECTIVELY
                    /CLEARING THE OUTPUT REGISTER SET ANY BIT IN
                    /THE INPUT REGISTER

2260  3030  INOU3,  DCA     TYPFLG      /CLEAR ERROR FLAG
2261  1177          TAD     C-62        /SET ITERATION COUNT
2262  3031          DCA     LPCNT       /TO 50 (DECIMAL)
2263  3021          DCA     DATA1       /CLEAR TEST DATA
2264  3022          DCA     DATA2       /CLEAR EXPECTED RESULT
2265  6007  INOU3A, CAF                 /INITIALIZE INTERFACE
2266  7040          CMA                 /SET AC=7777
2267  4440          DBSO                /BIT SET OUTPUT REGISTER
2270  4435          DBCI                /BIT CLEAR INPUT REGISTER
2271  7300          CLA CLL
2272  1027          TAD     FJUMPER     /GET FLIPFLOP JUMPER MASK
```

```
2273  7040          CMA                /GET TEST DATA2
2274  3022          DCA   DATA2        /COMPLEMENT
2275  1021          TAD   DATA1        /AND WITN COMPLEMENT OF JUMPER MASK
2276  7040          CMA                /TO GET EXPECTED RESULT
2277  0022          AND   DATA2
2300  3022          DCA   DATA2        /GET TEST DATA
2301  1021          TAD   DATA1        /BIT CLEAR OUTPUT REGISTER
2302  4437          DBCO
2303  7300          CLA CLL
2304  4436          DBRI               /READ INPUT REGISTER
2305  3023          DCA   DATA3        /SAVE REGISTER DATA
2306  1023          TAD   DATA3        /GET REGISTER DATA
2307  7041          CIA
2310  1022          TAD   DATA2        /COMPARE TO EXPECTED RESULT
2311  7650          SNA CLA            /ARE THEY THE SAME
2312  5317          JMP   .+5          /DATA CORRECT, CONTINUE
2313  4444          JMS I XERROR       /NO, ERROR
2314  3767          OUT4E-1            /"DBCO ERROR"
2315  3534          DH3-1              /"MASK EXPECTED RECEIVED
2316  7775          -3                 /NUMBER OF DATA WORDS
2317  4446          JMS I XLOOP2       /TEST FOR LOOP WITH SAME DATA
2320  5265          JMP   INOU3A       /LOOP WITH SAME DATA
2321  2021          ISZ   DATA1        /INCREMENT DATA PATTERN
2322  5265          JMP   INOU3A       /CONTINUE
2323  4445          JMS I XLOOP1       /CHECK FOR LOOP ON CURRENT TEST
2324  5263          JMP   INOU3+3      /LOOP ON CURRENT TEST

                    /WITH THE INPUT REGISTER SET TO ALL 1S, DOES SELECTIVELY
                    /CLEARING THE OUTPUT REGISTER CLEAR ANY BITS IN THE INPUT
                    /REGISTER (EXCEPT THOSE NOT FLIPFLOPS)

2325  3030  INOU4,  DCA   TYPFLG       /CLEAR ERROR FLAG
2326  1177          TAD   C-62         /SET ITERATION COUNT
2327  3031          DCA   LPCNT        /TO 50 (DECIMAL)
2330  3021          DCA   DATA1        /CLEAR TEST DATA
2331  6007          CAF                /INITIALIZE INTERFACE
2332  7040          CMA                /SET AC TO 7777
2333  4440          DBSO               /BIT SET OUTPUT REGISTER
2334  7300          CLA CLL
2335  1027          TAD   FJUMPER      /GET FLIPFLOP JUMPER MASK
2336  7040          CMA
2337  0021          AND   DATA1        /COMBINE WITH MASK
2340  7040          CMA
2341  3022  INOU4A, DCA   DATA2        /TO GET TEST DATA
2342  1021          TAD   DATA1        /GET TEST DATA
2343  4437          DBCO               /BIT CLEAR OUTPUT REGISTER
2344  7300          CLA CLL
2345  4436          DBRI               /READ INPUT REGISTER
2346  3023          DCA   DATA3        /SAVE REGISTER DATA
2347  1022          TAD   DATA2        /GET EXPECTED RESULT
2350  7041          CIA
2351  1023          TAD   DATA3        /COMPARE TO RECEIVED DATA
2352  7650          SNA CLA            /ARE THEY THE SAME
2353  5360          JMP   .+5          /DATA CORRECT, CONTINUE
2354  4444          JMS I XERROR       /NO, ERROR
```

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2355  3767          OUT4E-1          /"DBCO ERROR"
2356  3534          DH3-1            /"MASK EXPECTED RECEIVED"
2357  7775          -3               /NUMBER OF DATA WORDS
2360  4446          JMS I  XLOOP2    /TEST FOR LOOP WITH CURRENT DATA
2361  5331          JMP    INOU4A    /LOOP WITH SAME DATA
2362  2021          ISZ    DATA1     /INCREMENT DATA PATTERN
2363  5331          JMP    INOU4A    /CONTINUE
2364  4445          JMS I  XLOOP1    /CHECK FOR LOOP ON CURRENT TEST
2365  5330          JMP    INOU4+3   /LOOP ON CURRENT TEST
2366  5777'         JMP    INT1      /GO TO NEXT TEST
2377  2400
2400  2400  PAGE

                    /VERIFY THAT EACH BIT SET UP TO  SKIP DOES
                    /
2400  3030  INT1,   DCA    TYPFLG    /CLEAR ERROR FLAG
2401  1177          TAD    E-62      /SET ITERATION COUNT
2402  3031          DCA    LPCNT     /TO 50(DECIMAL)
2403  3022          DCA    DATA2
2404  6007  INT1A,  CAF              /INITIALIZE INTERFACE
2405  1022          TAD    DATA2
2406  0026          AND    IJUMPER
2407  7450          SNA
2410  5241          JMP    INT1D
2411  3021          DCA    DATA1     /SAVE TEST DATA
2412  1021          TAD    DATA1
2413  4440          DBSO             /BIT SET OUTPUT REGISTER
2414  7300          CLA CLL
2415  6003          SRQ              /IS INTERRUPT ACTIVE
2416  5223          JMP    .+5       /NO, CONTINUE
2417  4444          JMS I  XERROR    /YES, ERROR
2420  4042          INT1E-1          /INTERRUPT ACTIVE
2421  3515          DH1-1
2422  7777          -1               /NUMBER OF DATA WORDS TO BE OUTPUT
2423  4433          DBEI             /ENABLE INTERFACE
2424  6003          SRQ              /IS INTERRUPT ACTIVE
2425  5231          JMP    INT1AE    /NO, ERROR
2426  4434          DBSK             /IS FLAG SET
2427  5246          JMP    INT1BE    /NO, ERROR
2430  5237          JMP    INT1OK    /INTERRUPT ACTIVE, FLAG SET
2431  4434  INT1AE, DBSK             /IS INTERFACE FLAG SET
2432  5253          JMP    INT1CE
2433  4444          JMS I  XERROR    /NO, ERROR
2434  4042          INT1E-1
2435  3515          DH1-1
2436  7777          -1               /NUMBER OF WORDS TO BE OUTPUT
2437  4446  INT1OK, JMS I  XLOOP2    /TEST FOR LOOP ON SAME DATA, ESCAPE ON DATA ERROR
2440  5204          JMP    INT1A     /LOOP WITH SAME DATA
2441  2022  INT1D,  ISZ    DATA2     /INCREMENT DATA PATTERN
2442  5204          JMP    INT1A     /CONTINUE
2443  4445          JMS I  XLOOP1    /CHECK FOR LOOP ON CURRENT TEST
2444  5203          JMP    INT1+3    /LOOP ON CURRENT TEST
2445  5260          JMP    INT3      /GO TO NEXT TEST
```

```
2446 4444  INT1BE, JMS I  XERROR     /NO, ERROR
2447 4065          INT3E-1
2450 3515          DH1-1
2451 7777          -1                /NUMBER OF WORDS TO BE OUTPUT
2452 5237          JMP   INT10K
2453 4444  INT1CE, JMS I  XERROR     /NO, ERROR
2454 4077          INT4E-1
2455 3515          DH1-1
2456 7777          -1                /NUMBER OF WORDS TO BE OUTPUT
2457 5237,         JMP   INT10K

                   /VERIFY THAT EACH BIT NOT JUMPERD TO SKIP DOES NOT
                   /
2460 3030  INT3,   DCA   TYPFLG      /CLEAR ERROR FLAG
2461 1177          TAD   [-62        /SET ITERATION COUNT
2462 3031          DCA   LPCNT       /TO 50 (DECIMAL)
2463 3022          DCA   DATA2       /CLEAR TEST DATA
2464 6007  INT3A,  CAF               /INITIALIZE INTERFACE
2465 1026          TAD   IJUMPER     /GET JUMPER MASK
2466 7040          CMA               /COMPLIMENT FOR NO SKIP BITS
2467 0022          AND   DATA2       /GET BITS TO BE TESTED
2470 7450          SNA               /ARE ANY BITS TO BE TESTED
2471 5306          JMP   INT3C       /NO, GET NEXT DATA PATTERN
2472 3021          DCA   DATA1       /SAVE FOR OUTPUT
2473 1021          TAD   DATA1       /GET TEST DATA
2474 4440          DBSO              /BIT SET OUTPUT REGISTER
2475 7300          CLA CLL
2476 4434          DBSK              /IS FLAG SET
2477 5304          JMP   .+5         /NO, CONTINUE
2500 4444          JMS I  XERROR     /YES, ERROR
2501 3674          INIT3E-1          /"SKIP FLAG SET"
2502 3515          DH1-1
2503 7777          -1                /"REGISTER DATA"
2504 4446          JMS I  XLOOP2
2505 5264          JMP   INT3A
2506 2022  INT3C,  ISZ   DATA2
2507 5264          JMP   INT3A
2510 4445          JMS I  XLOOP1
2511 5263          JMP   INT3+3
2512 5777,         JMP   EPASS

                   /ERROR HANDLER
                   /
2577 3257  PAGE
2600 0000  ERROR,  0
2601 7300          CLA CLL
2602 1600          TAD I  ERROR      /GET POINTER TO ERROR MESSAGE
2603 3234          DCA   MESG        /SAVE POINTER
2604 2200          ISZ   ERROR
2605 1600          TAD I  ERROR      /GET POINTER TO DATA HEADER
2606 3236          DCA   DHDER       /SAVE HEADER
2607 2200          ISZ   ERROR       /NUMBER OF WORDS TO BE OUTPUT
```

```
2610   1600           TAD I   ERROR       /GET NUMBER OF DATA WORDS TO BE TYPED
2611   3264           DCA     DATCNT      /SAVE
2612   1200           TAD     ERROR       /GET ADDRESS OF TEST THAT FAILED
2613   1377           TAD     (-3
2614   3776'          DCA     LSTDGT
2615   1776'          TAD     LSTDGT
2616   3266           DCA     ERRAD
2617   7604           LAS
2620   0334           AND     SR01
2621   7640           SZA CLA
2622   5254           JMP     EHALT
2623   1030           TAD     TYPFLG
2624   7640           SZA CLA
2625   5241           JMP     DATOUT
2626   7040           CMA
2627   3030           DCA     TYPFLG      /CLEAR ERROR FLAG
2630   4775'          JMS I   OCTASC
2631   4442           JMS I   XPRINT
2632   3024           ERADR-1
2633   4442   MESG,   JMS I   XPRINT
2634   0000           0
2635   4442   DHDER,  JMS I   XPRINT
2636   0000           0
2637   4442           JMS I   XPRINT
2640   3512           CRLF-1
2641   1264   DATOUT, TAD     DATCNT      /NUMBER OF WORDS TO BE OUTPUT
2642   7650           SNA CLA
2643   5254           JMP     EHALT
2644   1265           TAD     DATAP
2645   3010           DCA     POINT1
2646   1410   BITS,   TAD I   POINT1
2647   4774'          JMS I   BITOUT
2650   2264           ISZ     DATCNT
2651   5246           JMP     BITS
2652   4442           JMS I   XPRINT
2653   3512           CRLF-1
2654   7604   EHALT,  LAS
2655   0333           AND     SR00
2656   7640           SZA CLA
2657   5262           JMP     .+3
2660   1266           TAD     ERRAD
2661   7402           HLT
2662   2200           ISZ     ERROR
2663   5600           JMP I   ERROR
2664   0000   DATCNT, 0
2665   0020   DATAP,  DATA1-1
2666   0000   ERRAD,  0
               /
               /TEST FOR LOOP ON CURRENT TEST
               /
2667   0000   LOOP1,  0
2670   1030           TAD     TYPFLG
2671   7650           SNA CLA
2672   5277           JMP     LP1EXA
2673   7604           LAS
```

```
2674  0341            AND   SR06
2675  7640            SZA   CLA
2676  5310            JMP   LP1EXX-1
2677  7604    LP1EXA, LAS
2700  0342            AND   SR05
2701  7640            SZA   CLA
2702  5305            JMP   LP1EXT
2703  2031            ISZ   LPCNT
2704  5311            JMP   LP1EXX
2705  7604    LP1EXT, LAS
2706  0335            AND   SR02
2707  7650            SNA   CLA
2710  2267            ISZ   LOOP1
2711  5667    LP1EXX, JMP I LOOP1

              /TEST FOR LOOP ON CURRENT DATA

2712  0000    LOOP2,  0
2713  1030            TAD   TYPFLG
2714  7650            SNA   CLA
2715  5326            JMP   LP2EXT
2716  7604            LAS
2717  0341            AND   SR06
2720  7650            SNA   CLA
2721  5326            JMP   .+5            /DATA CORRECT, CONTINUE
2722  1312            TAD   LOOP2
2723  1373            TAD   (5
2724  3312            DCA   LOOP2
2725  5712            JMP I LOOP2
2726  7604    LP2EXT, LAS
2727  0336            AND   SR03
2730  7650            SNA   CLA
2731  2312            ISZ   LOOP2
2732  5712            JMP I LOOP2
2733  4000    SR00,   4000
2734  2000    SR01,   2000
2735  1000    SR02,   1000
2736  0400    SR03,   0400
2737  0200    SR04,   0200
2740  0100    SR05,   0100
2741  0040    SR06,   0040


              /OCTAL TO PACKED ASCII CONVERSION

2773  0005
2774  3031
2775  3000
2776  3027
2777  7775

              PAGE    /
3000  0000    OCTASC, 0
3001  7300            CLA   CLL
3002  1227            TAD   LSTDGT         /GET WORD TO BE CONVERTED
3003  7002            BSW                  /SWAP HALVES, SEPARATE DIGITS,
```

```
3224  4212          JMS   SPLIT      /CONVERT MOST SIGNIFICANT
3225  3226          DCA   MSTDGT     /DIGITS TO ASCII
3226  1227          TAD   LSTDGT     /CONVERT LEAST SIGNIFICANT
3227  4212          JMS   SPLIT      /DIGITS TO ASCII
3217  3227          DCA   LSTDGT
3211  5600          JMP I OCTASC     /RETURN

3212  0000  SPLIT,  0
3213  2377          AND   (77
3214  7421          MQL
3215  7501          MQA
3216  7106          CLL RTL
3217  7004          RAL
3220  2376          AND   (707
3221  7501          MQA
3222  2376          AND   (707
3223  1375          TAD   (6060
3224  5612          JMP I SPLIT
3225  3736  ERADR,  TEXT  /..  /
3226  4040
3227  4040
3230  4000


            /OUTPUT 12 BIT BINARY WORD

3031  0000  BITOUT, 0
3032  7421          MQL              /SAVE DATA IN MQ
3033  1374          TAD   (-14       /SET UP TO OURPUT
3034  3020          DCA   CNTR1      /12 BITS
3035  7501  BIT01,  MQA              /GET DATA
3036  7104          CLL RAL
3037  7421          MQL              /GET MSB INTO LINK
3040  1373          TAD   ("1        /SAVE REST OF WORD
                                     /GET ASCII 1 INTO AC
3041  7420          SNL
3042  0372          AND   ("0        /IS BIT=1
3043  4443          JMS I XTYPE      /NO, CHANGE TO ASCII 0
3044  2020          ISZ   CNTR1      /OUTPUT BIT
3045  5235          JMP   BIT01      /CONTINUE
3046  1371          TAD   (240
3047  4443          JMS I XTYPE      /TYPE 2 SPACES
3050  1371          TAD   (240
3051  4443          JMS I XTYPE
3052  5631          JMP I BITOUT     /AFTER LAST BIT HAS BEEN
                                     /OUTPUTTED
                                     /RETURN


            /CHARACTER STRING OUTPUT ROUTINE

3171  0240
3172  0260
3173  0261
3174  7764
3175  6060
3176  0707
3177  3077
            PAGE   /
3200  0000  PRINT,  0
```

```
3221  7320        CLA CLL
3222  1620        TAD I  PRINT      /GET POINTER TO MESSAGE
3223  3010        DCA    POINT1     /SET UP AUTO-INDEX REGISTER
3224  2200        ISZ    PRINT      /SET UP RETURN
3225  1412        TAD I  POINT1     /GET PACKED WORD
3226  7421        MQL               /SAVE IN MQ
3227  7501        MQA               /GET WORD
3210  7002        BSW               /SWAP HALVES
3211  4215        JMS    TYPSET     /DECODE AND OUTPUT
3212  7501        MQA               /GET WORD
3213  4215        JMS    TYPSET     /DECODE AND OUTPUT
3214  5205        JMP    PRINT+5    /CONTINUE

                  /UNPACK, DECODE, OUTPUT

3215  2000  TYPSET, 0
3216  2243        AND    K0077      /MASK UNWANTED BITS
3217  7450        SNA               /IS AC=0
3220  5600        JMP I  PRINT      /YES, END OF MESSAGE, EXIT
3221  1244        TAD    M40        /SUBTRACT 40
3222  7510        SPA               /IS PACKED CHARACTER >40
3223  5226        JMP    .+3        /NO
3224  1250        TAD    K240       /YES, CONVERT TO ASCII
3225  5241        JMP    MTP        /OUTPUT
3226  7001        IAC               /ADD 1 TO AC
3227  7440        SZA               /IS CHARACTER=37
3230  5233        JMP    .+3        /NO,
3231  1245        TAD    K215       /GET CODE FOR CARRIAGE RETURN
3232  5241        JMP    MTP        /OUTPUT
3233  7001        IAC               /ADD 1 TO AC
3234  7440        SZA               /IS CHARACTER=37
3235  5240        JMP    .+3        /NO
3236  1246        TAD    K212       /GET CODE FOR LINE FEED
3237  5241        JMP    MTP        /OUTPUT
3240  1247        TAD    K336       /PACKED CHARACTER >40, CONVERT TO ASCII
3241  4443  MTP,   JMS I  XTYPE     /OUTPUT
3242  5615        JMP I  TYPSET
3243  0077  K0077, 77
3244  7740  M40,   -40
3245  0215  K215,  215
3246  0212  K212,  212
3247  0336  K336,  336
3250  0240  K240,  240

                  /OUTPUT ONE CHARACTER TO TTY

3251  0000  TYPE,  0
3252  6046        TLS
3253  6041        TSF
3254  5253        JMP    .-1
3255  7200        CLA
3256  5651        JMP I  TYPE
```

```
3257    7604    EPASS,  LAS
3262    2777,           AND     SR04
3261    7640            SZA CLA
3262    5776'           JMP     INIT1
3263    7604            LAS
3264    0775',          AND     SR05
3265    7640            SZA CLA
3266    5272            JMP     EPAS1
3267    4442            JMS I   XPRINT
3270    3274            MEP-1
3271    5776'   EPAS1,  JMP     INIT1
3272    1374            TAD     (207
3273    4251            JMS     TYPE
3274    5776'           JMP     INIT1
3275    3736    MEP,    TEXT    /**DR/
3276    0422
3277    0000


3374    0207            /TELETYPE MESSAGES
3375    2740            /
3376    0400
3377    2737
3400    3736    PAGE
3400    3736    M1,     TEXT    /**SET SR FOR DEVICE CODE AND CONT/
3401    2305
3402    2440
3403    2322
3404    4006
3405    1722
3406    4004
3407    0526
3410    1103
3411    0540
3412    0317
3413    0405
3414    4001
3415    1604
3416    4003
3417    1716
3420    2400
3421    3736    M2,     TEXT    /**SET SR FOR INTERRUPT JUMPERS AND CONT/
3422    2305
3423    2440
3424    2322
3425    4006
3426    1722
3427    4011
3430    1624
3431    0522
3432    2225
3433    2024
```

```
3434  4012
3435  2515
3436  2005
3437  2223
3440  4001
3441  1604
3442  4003
3443  1716
3444  2400
3445  3736    M2A,    TEXT    /••SET SWITCHES FOR FLIPFLOP JUMPERS AND CONTINUE/
3446  2305
3447  2440
3450  2327
3451  1124
3452  0310
3453  0523
3454  4006
3455  1722
3456  4006
3457  1411
3460  2006
3461  1417
3462  2040
3463  1225
3464  1520
3465  0522
3466  2340
3467  0116
3470  0440
3471  0317
3472  1624
3473  1116
3474  2505
3475  0000
3476  3736    M3,     TEXT    /••SET SR FOR RUN AND CONT7
3477  2305
3500  2440
3501  2322
3502  4006
3503  1722
3504  4022
3505  2516
3506  4001
3507  1604
3510  4003
3511  1716
3512  2400
3513  3736    CRLF,   TEXT    /••/
3514  0000
                      /DATA HEADERS
                      /
3515  0000    DH0,    0
3516  3736    DH1,    TEXT    /••REGISTER DATA/
3517  2205
```

```
3520  0711
3521  2324
3522  0522
3523  4004
3524  0124
3525  0100
3526  3736    DH2,    TEXT    /••AC CONTENTS/
3527  0103
3530  4003
3531  1716
3532  2405
3533  1624
3534  2300
3535  3736    DH3,    TEXT    /••MASK        EXPECTED    RECEIVED/
3536  1501
3537  2313
3540  4040
3541  4040
3542  4040
3543  4040
3544  4040
3545  0530
3546  2005
3547  0324
3550  0504
3551  4040
3552  4040
3553  4040
3554  2205
3555  0305
3556  1126
3557  0504
3560  0000
3561  3736    DH4,    TEXT    /••EXPECTED    RECEIVED/
3562  0530
3563  2005
3564  0324
3565  0504
3566  4040
3567  4040
3570  4040
3571  2205
3572  0305
3573  1126
3574  0504
3575  0000
3576  3736    DH5,    TEXT    /••REGISTER    DATA OUT    DATA IN/
3577  2205
3600  0711
3601  2324
3602  0522
3603  4040
3604  4040
3605  4040
3606  4004
```

```
                                    DH6,    TEXT    /**AC CONTENTS    DATA OUT    DATA IN/

3607  2124
3610  0140
3611  1725
3612  2440
3613  4040
3614  4040
3615  4040
3616  0401
3617  2401
3620  4011
3621  1600
3622  3736
3623  0103
3624  4003
3625  1716
3626  2405
3627  1624
3630  2340
3631  4040
3632  4004
3633  0124
3634  0140
3635  1725
3636  2440
3637  4040
3640  4040
3641  4040
3642  0401
3643  2401
3644  4011
3645  1620

                              /ERROR MESSAGE
                              /
                      INITIE, TEXT    /OUTPUT REG NOT CLEARED/

3646  1725
3647  2420
3650  2524
3651  4022
3652  0507
3653  4016
3654  1724
3655  4003
3656  1405
3657  0122
3660  0504
3661  0000
                      INIT2E, TEXT    /INPUT REG NOT CLEARED/

3662  1116
3663  2025
3664  2440
3665  2205
3666  2740
3667  1617
3670  2440
3671  0314
3672  0501
```

```
3673   2205
3674   0400
3675   2313        INIT3E,  TEXT    /SKIP FLAG SET/
3676   1120
3677   4006
3700   1401
3701   0740
3702   2305
3703   2400
3704   0402        TRAN1E,  TEXT    /DBRO DID NOT CLEAR AC/
3705   2217
3706   4004
3707   1104
3710   4016
3711   1724
3712   4003
3713   1405
3714   0122
3715   4001
3716   0300
3717   0402        TRAN2E,  TEXT    /DBRI DID NOT CLEAR AC/
3720   2211
3721   4004
3722   1104
3723   4016
3724   1724
3725   4003
3726   1405
3727   0122
3730   4001
3731   0300
3732   0402        TRAN3E,  TEXT    /DBSO CHANGED AC/
3733   2317
3734   4003
3735   1001
3736   1607
3737   0504
3740   4001
3741   0300
3742   0402        TRAN4E,  TEXT    /DBCO CHANGED AC/
3743   0317
3744   4003
3745   1001
3746   1607
3747   0504
3750   4001
3751   0300
3752   0402        TRAN5E,  TEXT    /DBCI CHANGED AC/
3753   0311
3754   4003
3755   1001
3756   1607
3757   0504
3760   4001
3761   0300
```

```
3762 0402   OUT1E,  TEXT   /DBSO ERROR/
3763 2317
3764 4025
3765 2222
3766 1722
3767 0000
3770 0402   OUT4E,  TEXT   /DBCO ERROR/
3771 0317
3772 4005
3773 2222
3774 1722
3775 0000
3776 0402   OUT7E,  TEXT   /DBRO ERROR/
3777 2217
4000 4005
4001 2222
4002 1722
4003 0000
4004 0402   IN2E,   TEXT   /DBCI ERROR/
4005 0311
4006 4005
4007 2222
4010 1722
4011 0000
4012 1116   IN3E,   TEXT   /INPUT REGISTER DATA ERROR/
4013 2025
4014 2440
4015 2205
4016 0711
4017 2324
4020 0522
4021 4004
4022 0124
4023 0140
4024 0522
4025 2217
4026 2200
4027 1401   IN4E,   TEXT   /LATCH ERROR/
4030 2403
4031 1040
4032 0522
4033 2217
4034 2200
4035 0402   IN9E,   TEXT   /DBRI ERROR/
4036 2211
4037 4005
4040 2222
4041 1722
4042 0000
4043 1116   INT1E,  TEXT   /INTERRUPT ACTIVE/
4044 2405
4045 2222
4046 2520
4047 2440
4050 0103
```

```
4051 2411
4052 2605
4053 0000
4054 1617      INT2E, TEXT    /NO INTERRUPT, SKIP/
4055 4011
4056 1624
4057 0522
4060 2225
4061 2024
4062 5440
4063 2313
4064 1120
4065 0000
4066 1116      INT3E, TEXT    /INTERRUPT, NO SKIP/
4067 2405
4070 2222
4071 2520
4072 2454
4073 4016
4074 1740
4075 2313
4076 1120
4077 0000
4100 1617      INT4E, TEXT    /NO INTERRUPT, NO SKIP/
4101 4011
4102 1624
4103 0522
4104 2225
4105 2024
4106 5440
4107 1617
4110 4023
4111 1311
4112 2000
4113 1617      INT5E, TEXT    /NO SKIP/
4114 4023
4115 1311
4116 2000
4117 2313      INT6E, TEXT    /SKIP/
4120 1120
4121 0000

               $

0177 7716
```

0000 0100
0200 0300
0400 0500
0600 0700
1000 1100
1200 1300
1400 1500
1600 1700
2000 2100
2200 2300
2400 2500
2600 2700
3000 3100
3200 3300
3400 3500
3600 3700

```
4000    11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100    11111111  11111111  11000000  00000000  00000000  00000000  00000000  00000000
4200
4300
4400
4500
4600
4700

5000
5100
5200
5300
5400
5500
5600
5700
6000
6100
6200
6300
6400
6500
6600
6700
7000
7100
7200
7300
7400
7500
7600
7700
```

| Symbol | Value | Symbol | Value | Symbol | Value | Symbol | Value |
|---|---|---|---|---|---|---|---|
| BITCI | 3035 | IN1B | 1420 | K0077 | 3243 | SR06 | 2741 |
| BITOUT | 3031 | IN2 | 1434 | K212 | 3246 | SRQ | 6003 |
| BITS | 2646 | IN2E | 4004 | K215 | 3245 | START1 | 0202 |
| BSW | 7002 | IN3 | 1462 | K240 | 3250 | START2 | 0244 |
| CAF | 6007 | IN3A | 1466 | K336 | 3247 | TIOT | 0250 |
| CNTR1 | 2020 | IN3E | 4012 | LOOP1 | 2667 | TRAN1 | 0460 |
| CRLF | 3513 | IN4E | 4027 | LOOP2 | 2712 | TRAN1E | 3704 |
| DATA1 | 0021 | IN5 | 1600 | LP1EXA | 2677 | TRAN2 | 0477 |
| DATA2 | 0022 | IN5A | 1604 | LP1EXT | 2705 | TRAN2E | 3717 |
| DATA3 | 0023 | IN5C | 1633 | LP1EXX | 2711 | TRAN3 | 0516 |
| DATA4 | 0024 | IN6 | 1637 | LP2EXT | 2726 | TRAN3E | 3732 |
| DATA5 | 0025 | IN6A | 1644 | LPCNT | 0031 | TRAN4 | 0536 |
| DATAP | 2665 | IN6C | 1672 | LSTDGT | 3027 | TRAN4E | 3742 |
| DATCNT | 2664 | IN7 | 1676 | M1 | 3400 | TRAN5 | 0556 |
| DATOUT | 2641 | IN7A | 1702 | M2 | 3421 | TRAN5E | 3752 |
| DBCI | 4435 | IN7C | 1731 | M2A | 3445 | TRAN6 | 0600 |
| DBCIX | 0300 | IN8 | 2000 | M3 | 3476 | TRAN7 | 0616 |
| DBCO | 4437 | IN8A | 2005 | M40 | 3244 | TRAN8 | 0634 |
| DBCOX | 0312 | IN9 | 2030 | MEP | 3275 | TYPE | 3251 |
| DBDI | 4432 | IN9A | 2034 | MESG | 2634 | TYPFLG | 0030 |
| DBDIX | 0261 | IN9E | 4035 | MQA | 7501 | TYPSET | 3215 |
| DBEI | 4433 | INIT1 | 0400 | MQL | 7421 | XDBCI | 0035 |
| DBEIX | 0266 | INIT1E | 3646 | MSTDGT | 3026 | XDBCO | 0037 |
| DBRI | 4436 | INIT2 | 0416 | MTP | 3241 | XDBDI | 0032 |
| DBRIX | 0305 | INIT2E | 3662 | OCTASC | 3000 | XDBEI | 0033 |
| DBRO | 4441 | INIT3 | 0435 | OUT1 | 1000 | XDBRI | 0036 |
| DBROX | 0324 | INIT3E | 3675 | OUT1E | 3762 | XDBRO | 0041 |
| DBSK | 4434 | INOU1 | 2200 | OUT2 | 1033 | XDBSK | 0034 |
| DBSKX | 0273 | INOU1A | 2205 | OUT3 | 1054 | XDBSO | 0040 |
| DBSO | 4440 | INOU2 | 2230 | OUT3A | 1060 | XERROR | 0044 |
| DBSOX | 0317 | INOU2A | 2235 | OUT4 | 1105 | XLOOP1 | 0045 |
| DH0 | 3515 | INOU3 | 2260 | OUT4A | 1111 | XLOOP2 | 0046 |
| DH1 | 3516 | INOU3A | 2265 | OUT4E | 3770 | XPRINT | 0042 |
| DH2 | 3526 | INOU4 | 2325 | OUT5 | 1200 | XTYPE | 0043 |
| DH3 | 3535 | INOU4A | 2331 | OUT5A | 1205 | | |
| DH4 | 3561 | INT1 | 2400 | OUT6 | 1230 | | |
| DH5 | 3576 | INT1A | 2404 | OUT6A | 1234 | | |
| DH6 | 3622 | INT1AE | 2431 | OUT7 | 1262 | | |
| DHDER | 2636 | INT1BE | 2446 | OUT7A | 1266 | | |
| DIOT | 0260 | INT1CE | 2453 | OUT7E | 3776 | | |
| EHALT | 2654 | INT1D | 2441 | OUT8 | 1315 | | |
| EPAS1 | 3272 | INT1E | 4043 | OUT8A | 1322 | | |
| EPASS | 3257 | INT1OK | 2437 | PNTR1 | 0233 | | |
| ERADR | 3025 | INT2E | 4054 | POINT | 0010 | | |
| ERRAD | 2666 | INT3 | 2460 | PRINT1 | 3200 | | |
| ERROR | 2600 | INT3A | 2464 | SPLIT | 3012 | | |
| FJUMPE | 0027 | INT3C | 2506 | SR00 | 2733 | | |
| IJUMPE | 0026 | INT3E | 4066 | SR01 | 2734 | | |
| IN1 | 1400 | INT4E | 4100 | SR02 | 2735 | | |
| IN10 | 2063 | INT5E | 4113 | SR03 | 2736 | | |
| IN10A | 2070 | INT6E | 4117 | SR04 | 2737 | | |
| IN1A | 1403 | IOTS | 0247 | SR05 | 2740 | | |

/MAINDEC-08-DHDRA-A     PAL10    V141    29-MAR-72     16:07    PAGE 1-36.

ERRORS DETECTED: 0

LINKS GENERATED: 18

RUN-TIME: 15 SECONDS

3K CORE USED